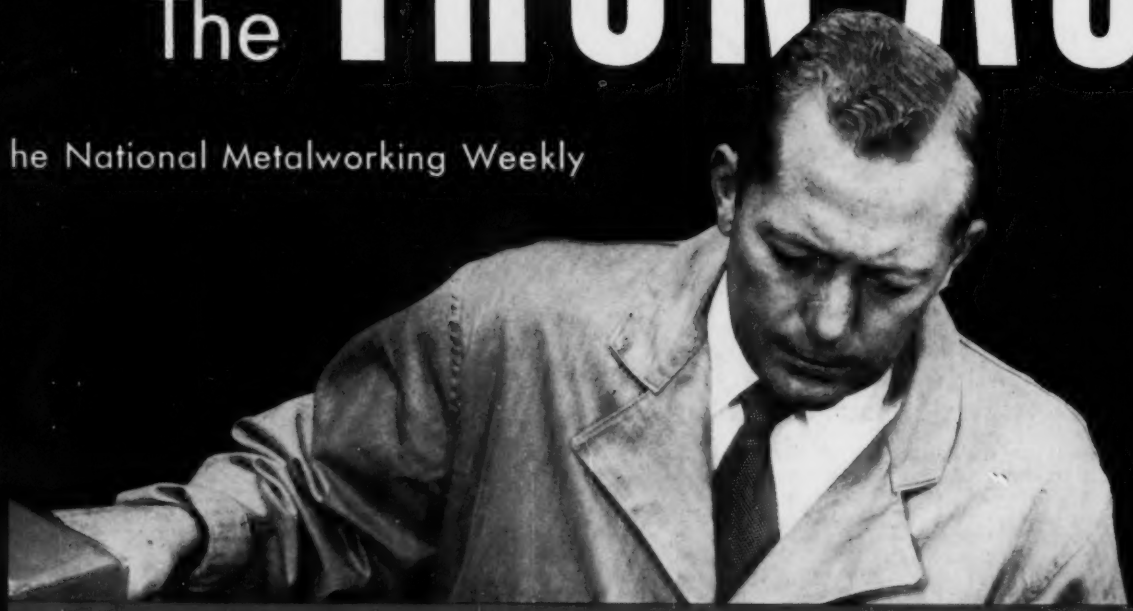
March 8, 1956

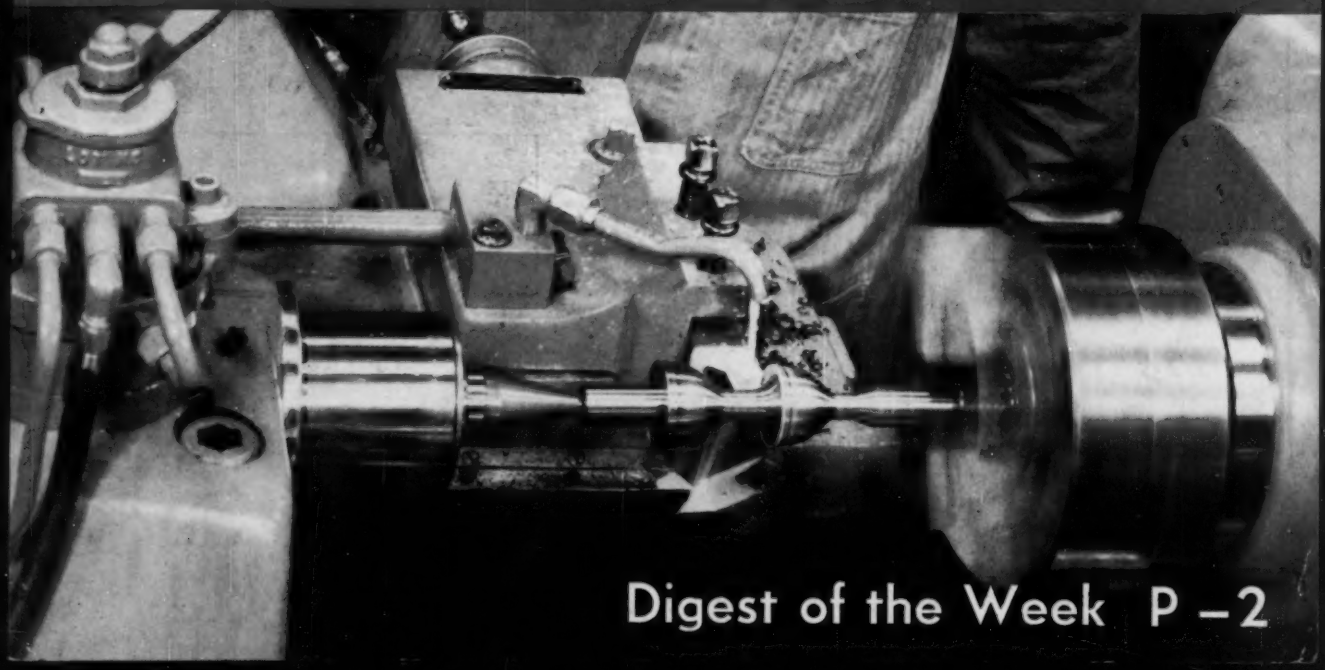
The IRON AGE

he National Metalworking Weekly



Tool Engineers' Show Issue

HOW TO GET MORE FOR YOUR TOOLING DOLLAR



Digest of the Week P – 2

Move it above -- have more room below!

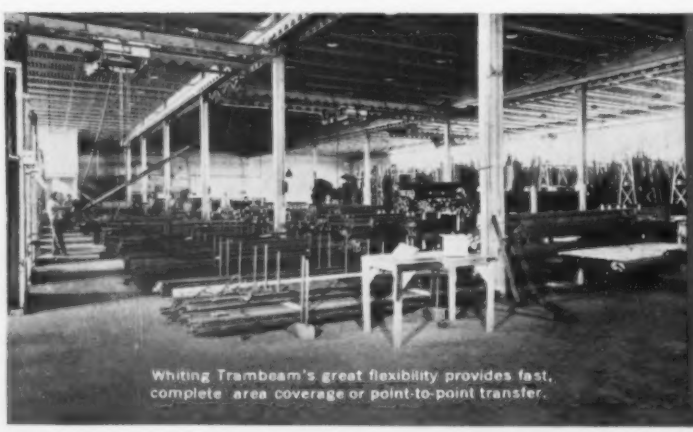
WHITING TRAMBEAM belongs in your plans to cut handling costs!

Production or warehousing operations move into *high* speed when Whiting Trambeam goes into action *overhead*. Trambeam systems lift products and materials up – quickly carry them wherever desired. No more traffic bottlenecks. No more handling "obstacle courses." Trambeam *increases* working or storage space while reducing handling costs.

With capacities up to 15 tons, Trambeam provides you with point-to-point transfer or complete area coverage. Every installation is individually engineered by your experienced Trambeam distributor. Let us put you in touch with him now – let him tell you all about Trambeam and its many applications. Write for his name and address – we'll send it to you immediately, along with our 24-page Trambeam Catalog.

WHITING CORPORATION
15601 Lathrop Avenue, Harvey, Illinois

WHITING Manufactures Cranes, Trackmobiles, Trambeam Handling Systems; Foundry, Railroad and Chemical Processing Equipment.



Whiting Trambeam's great flexibility provides fast, complete area coverage or point-to-point transfer.

WHITING
TRAMBEAM

XIV

This is the fourteenth of a series of advertisements dealing with basic facts about alloy steels. Though much of the information is elementary, we believe it will be of interest to many in this field, including men of broad experience who may find it useful to review fundamentals from time to time.

Silicon - What It Is and What It Does in Alloy Steels

Silicon is a very abundant nonmetallic element, one of the chief elementary constituents of the earth's crust. In the form of ferrosilicon, it is used by steelmakers as a deoxidizer and hardener in both alloy and carbon steels.

When the maximum silicon content is specified within the limits of 0.60 to 2.20 pct, the resulting steel is classed as a silicon alloy steel. However, all other standard alloy grades are specified to a range of 0.20 to 0.35 silicon for purposes of deoxidation. Silicon has several interesting effects, among them three that should be noted carefully: (1) it raises the critical temperature for heat-treatment; (2) as the amount is increased, it increases the susceptibility of steel to decarburization and graphitization; (3) combined with other alloying elements such as nickel, chromium, and tungsten, it promotes resistance to high temperature oxidation.

Silicon-Manganese Steels

Of the alloy steels relying heavily on silicon, one of the most important groups is the silicon-manganese series. As mentioned above, silicon is recognized as a deoxidizing agent, and a powerful one. Manganese behaves in the same manner but to a lesser degree.

Manganese exerts beneficial effects on the mechanical properties of heat-treated steel. Silicon as an alloy increases the strength. A properly balanced combination of the two elements produces a steel with unusually high strength, and with good ductility and shock-resistance.

Silicon-manganese steel has been widely used for the making of coil and leaf-type springs. It has also been used successfully for chisels, drift pins, punches, shear blades, mine bits, and other products that must be shock-resistant. It responds readily to oil-quenching, and when tempered at the correct temperature, it possesses not only shock-resistance but toughness and strength.

We invite you to consult with Bethlehem metallurgists whenever you wish to know more about silicon and its uses in steel. If you care to have them do so, these technicians will gladly suggest the proper analysis for your particular needs. Whatever it is, Bethlehem can furnish it, for Bethlehem makes all AISI standard alloy steels, as well as special-analysis steels and the full range of carbon grades.

If you would like to have a reprint of this advertisement, or of the entire series from I through XIV, please write to us, addressing your request to Publications Dept., Bethlehem Steel Company, Bethlehem, Pa.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

DIGEST OF THE WEEK IN METALWORKING

March 8, 1956—Vol. 177, No. 10

The IRON AGE

Digest of the Week in Metalworking

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Address mail to The IRON AGE
Chestnut and 56th Sts. Philadelphia 39, Pa.

NEWS DEVELOPMENTS

STEEL LABOR WANTS ANOTHER SERVING P. 115

McDonald will "throw the book" at steel bargainers this year. He wants supplementary unemployment benefits and a wage boost, among other things. Odds are even for peace.

WHAT'S THE STATUS OF TOOL TAPE CONTROLS? P. 118

Machine Tool Show last year afforded view of a variety of tape and card controls for machine tools. Answering the need for efficient set-up in short run operations, controls of a relatively simple type are finding wide application. More complex type are used mostly in aircraft work.

HOW TO MAKE GOOD USE OF ORE FINES P. 119

Lorain Works of National Tube uses ore fines compressed into cylinder form for direct charging into open-hearths. Results are better analysis control and somewhat faster open-hearth heats.

ARE AIRCRAFT PROFITS OUT OF LINE? P. 124

Congressional probers don't find any easy answers in aircraft profit issue. Question of government ownership of aircraft facilities used rent-free is also raised. Since most plane contracts are for defense, adding to cost would not save taxpayer.

WAR PLANNERS SEE COLD WAR CONTINUING P. 137

Things will continue tense between U. S. and Russia for the next 30 to 40 years. Mobilization men tell Congress planning function will cost at least $500,000 a year.

GETTING TOP tooling value is the subject of the 16-page special round-up story beginning on P. 153. Shown here is a valve plunger on a Monarch Model 20 Mona-Matic lathe.

TOOL BUILDERS SEEK TO END SHIPPING LAG P. 143

Machine tool orders continue to roll in but much of the business is still on paper. Companies are pushing shipments in an effort to cash in on demand. They see their market continuing strong. There has been no letup in the spurt that began last fall and new auto models are coming.

SPECIAL FEATURES

HOW TO GET MORE FOR YOUR TOOLING DOLLAR P. 153

Every manufacturing plant has many, probably hundreds, of opportunities to get more for each tooling dollar. But usually, they're scattered through many areas of a plant's operations. The problem is to find them. Once found, it becomes a matter of making the most of each such opportunity.

WHAT ARE SOME OF THESE SAVINGS AREAS?

Grouped in this feature, second in the current "Metalworking Dollar" series, are the combined opinions of some of the country's top tooling experts on this subject. Their suggestions on where tooling savings can be made range from the fundamentals of part design to the actual selection of equipment and accessories. In every case an effort has been made to offer workable, cost-saving ideas to tool engineers, production men, purchasing agents—all those involved in the many phases of tooling problems.

AND SINCE TOOLING IS A BIG TOPIC . . .

The material has been divided into two major sections for your greater reading convenience. The first covers tooling, while the second is made up of tool steel charts.

TOOLING FACTORS

Every tooling decision is made with a finished part in mind. So periodic reviews of design and processing methods are very much in order. These can help answer such questions as, Is the best material that specified for the part? Could tool standardization, more reasonable tolerances, better process integration cut tooling costs? Are your cutting tools, coolants, jigs and fixtures the best for the job at hand? How well-planned is your maintenance program?

TOOL STEEL CHARTS

Here are up-to-date editions of the comparable brand tool steel charts which have long been published by the IRON AGE. Besides brands, they cover composition of all the major AISE-SAE tool steels, selection, forging and heat-treating.

MARKETS AND PRICES

THE TREND IN MODERATE HEAT SOURCES P. 117

IRON AGE survey covers use of steam, electric, and open flame in nine basic metalworking operations. Most plants responding to questionnaire indicate trend toward use of open flame as moderate heat source.

TINPLATE FACES SERIOUS MARKET CHALLENGE P. 120

American Can researchers are searching hard for a way to make cans without tin. Progress is reported. A huge market is at stake. Tinplate consumption still sets records.

METAL MEN STEP UP INDIRECT SELLING P. 122

Alcoa, U. S. Steel are among basic producers making a strong pitch to home consumers. Idea is to boost sales of specific metal products, secure goodwill of immediate customer. Others are reaching the customer's customer with technical service.

HOW SERIOUS ARE AUTOMOTIVE CUTBACKS? P. 132

Pessimists have Detroit flat on its back, but real picture is quite different. No further cutbacks are in sight as spring selling season arrives with inventories not out of line. Production will not come back to 1955 levels, but record will be good.

STEEL BRACES FOR BIG LABOR DEMANDS P. 251

Reports are that steel labor will toss a near-40¢ package when contract negotiations open this summer. But chances are 50-50 for peace. Meanwhile steel market continues strong.

NEXT WEEK:

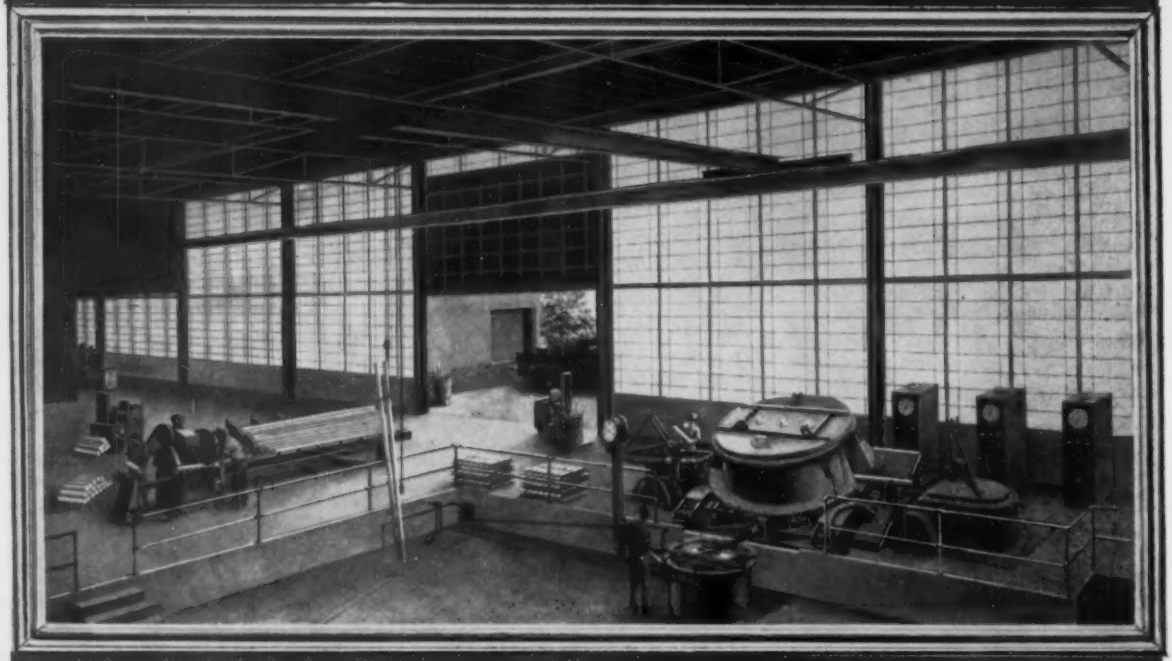
ARE WE GETTING THE MOST OUT OF MANAGERS?

Heavy management workload in production and marketing has companies thinking more about the individual manager. Is he happy in his work? Do personnel policies foster efficient manager performance? Next week's story tells what others are saying and doing in this vital area.

CUT BLANKING COSTS WITH SIMPLIFIED DESIGN

Simple blank design provides a direct answer to how blanking costs can be effectively cut. Simplicity lowers tool costs, increases production and extends tool life. These down-to-earth hints for basic metal blank design point out the short-cuts that spell economy, based on shop experience.

AJAX INDUCTION FURNACES
Will Reduce Metal Costs for You Too!



INSTALLATION AT VALLEY METAL PRODUCTS COMPANY—PLAINWELL, MICH.
(SUBSIDIARY OF MUELLER BRASS CO.)

Manufacturers of "Vampco" architectural life long aluminum alloy extrusions, Valley Metal Products Co., use Ajax furnaces exclusively in their billet casting shop, because these furnaces enable them to produce aluminum alloy billets from selected scrap in the high quality required for their product. The compact layout of this casting shop, shown in the picture, includes two 166 kw Ajax melting furnaces and one Ajax 10,000 lbs. holding furnace which pours into a semi-continuous casting machine. Operation is continuous. **Production is 750,000 lbs. per month.** Metal losses are below 1%. The holding furnace requires no fluxing or chlorinating. Maintenance is low. Working conditions are comfortable and permit full utilization of all productive efforts.

SEND FOR BULLETIN R-40

AJAX ENGINEERING CORP., TRENTON, N. J.

AJAX TAMA-WYATT

INDUCTION MELTING FURNACE

AJAX ELECTRO METALLURGICAL CORP., and Associated Companies
AJAX ELECTROTHERMIC CORP., Ajax-Northrup High Frequency Induction Furnaces
AJAX ELECTRIC CO., The Ajax-Hultgren Electric Salt Bath Furnace
AJAX ELECTRIC FURNACE CORP., Ajax-Wyatt Vacuum Furnaces and Others

If you were to see such an advertisement would you think it a fraud? If you considered it possible, would you think it was a development of this atomic day in which we live?

Believe it or not, ferro uranium was produced and uranium steel was produced not this month, or this year, but more than thirty-five years ago.

A treatise published in 1921, giving a full account of this unbelievable ferro-alloy said in part:

> "Uranium is supplied to the steel manufacturer in the form of Ferro-uranium. No difficulties in its employment are found, provided that reasonable precautions are taken in its addition; such precautions are explainable by *the remarkable chemical activity of uranium.*"

Prophetic words those! Little did the experimenters of 1921 realize what a monster they had by the tail. In undramatic language, the writer of this treatise suggested that uranium steel would "increase tool life" and concluded by saying, "Uranium steel marks the greatest single advance in alloy steels in recent years." This evaluation of Uranium steel proved to be far too optimistic. It was difficult to control and never won for itself a place in industry.

So we don't have any ferro-uranium for sale, but we are proud of an industry that has enough imagination to run thirty years out beyond the frontiers of scientific knowledge.

We're proud to be a part of the alloy steel industry for whom we have produced quality ferro-alloys for almost a third of a century.

OHIO FERRO PRODUCTS

- FERRO-SILICON 25 - 50 - 65 - 75 - 85 - 90%
- SPECIAL BLOCKING 50% FERRO-SILICON
- SILICON METAL
- LOW CARBON FERROCHROME
- HIGH CARBON FERRO-CHROME
- LOW CARBON FERRO-CHROME SILICON
- STD. FERRO-MANGANESE
- SILICO-MANGANESE
- MED. CARBON FERRO-MANGANESE
- BORDSIL
- SIMANAL
- RARE EARTH ALLOYS

Briquets
- SILICON
- MANGANESE
- SILICO-MANGANESE
- CHROME

DEPENDABILITY · PHILO · QUALITY · SERVICE
DEPENDABILITY · TACOMA · QUALITY · SERVICE
DEPENDABILITY · BRILLIANT · QUALITY · SERVICE

Ohio Ferro-Alloys Corporation
Canton, Ohio
Chicago Detroit Pittsburgh Tacoma Seattle Denver
Minneapolis Birmingham San Francisco Los Angeles

Wherever you look there's *Stainless*

● And there will be even more stainless steel used on the cars of tomorrow. Designers know that automobile buyers are becoming increasingly conscious of the fact that stainless steel fights rust, pitting and road abrasion with much greater success than any other metal. Parts made of stainless steel stay newer longer — require far less elbow grease to maintain.

Unusual brightness of finish, plus the consistent uniformity of every inch of every coil, are two big reasons why Sharon has always been a major supplier of stainless steel to the automotive industry.

This Sharon quality and familiarity with the industry's needs can be invaluable production assets to you.

SHARON *Stainless Steel*

SHARON STEEL CORPORATION *Sharon, Pennsylvania*

DISTRICT SALES OFFICES: Chicago, Cincinnati, Cleveland, Dayton, Detroit, Grand Rapids, Indianapolis, Los Angeles, Milwaukee, New York, Philadelphia, Rochester, San Francisco, Sharon, Seattle, Montreal, Que., Toronto, Ont.

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FOUNDED 1855

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Indexed in the Industrial Arts Index and the Engineering Index.

BPA NBP

EDITORIAL

Now It Is Your Turn To Give!

◆ YOU BUSINESSMEN who support President Eisenhower for another term have a great responsibility. Ike's decision was the supreme unselfish act of a simple, forthright and patriotic man.

The question of Ike's running has been enveloped in more emotion than any single development in recent history; probably rightly so. The President is an unusual person: he is loved by the people generally and is respected and supported by most businessmen.

No doubt there are millions who think that had Ike given top consideration to his own health and feelings he would have been justified in dropping out. But then Ike is Ike. And because he is that way he will have the prayers of everyone.

The President has made his own decision. No one made it for him. He is the one who will live with it and live up to it; as he has always done when duty and love of country have been involved.

The election period from here on out will be quite rough. You can expect attacks on business to be stepped up somewhat. The Administration will be accused often and loudly of benefiting business at the expense of the people. Nothing could be further from the truth.

The President has not leaned over backwards for business. He has made it toe the mark. He has simply insisted on fair and reasonable treatment for all. And when you do that, brother, you have your hands full.

Yet you have a duty to the President if you are in his corner. Now is the time when you can repay him for his confidence in you and make his decision a little easier to bear in the next few years.

You can conduct yourself and your business the way you think the President would do it. You can stay clear of pressure groups who do not always see the "whole" picture. And when it comes to sounding off, think a little before you talk.

See that you and your friends are in tune with an Administration which believes in peace with strength; prosperity without bankruptcy; world leadership without dishonor; domestic tranquility without surrender. Your job is cut out for you!

Tom Campbell

EDITOR-IN-CHIEF

VERSATILE

MILL-M-MATIC for Accurate, Heavy Duty Production Milling . . . .

. . . for EFFICIENCY

All machine functions within easy reach. All-electric, automatic controls built to conform with J. I. C. standards.

. . . for POWER

25 Hp. Anti-Friction Spindle Drive

Heavy duty milling head driven by large bull gear through involute spline. Extra wide bearing surface in housing when quill is fully extended.

. . . for QUICK, QUIET OPERATION

Hardened, ground gearing. Helical change gears for quick speed selections. Automatic spindle stop. 2-way automatic table cycles.

All the features of Mill-M-Matic point up to high, accurate production.

A fresh approach employing control by electric-mechanical powered action opens new possibilities in long life and precision operation in the field of *production milling*. Our 10-page bulletin describes all the advantages found in Mill-M-Matic.

The MOTCH & MERRYWEATHER Machinery Co.

MACHINERY MANUFACTURING DIVISION

CLEVELAND 13, OHIO

dear editor:

letters from readers

Steel for Schools

Sir:

As everyone well knows, the country is facing a crisis in school-housing. The situation is made worse because of the inability to obtain the necessary steel products for school construction. Many of the school buildings under contract will not be completed for the opening of school next fall, as planned, unless something is done to relieve the situation. The Federal Government has no controlled materials program at present, and we feel certain that the industry shares with us the belief that government controls at this time would be undesirable.

The total requirement of steel for school construction amounts to only about 500,000 tons a year, which is a very small fraction of the total steel output. Although negligible in the total steel market, this shortage of school construction steel is causing thousands of children to be housed in obsolete and overcrowded classrooms. *R. L. Hamon, Chief, School Housing Section, Dept. of Health, Education, and Welfare, Office of Education, Washington, D. C.*

Steel companies are doing what they can to allocate steel among a host of claimants, each of whom honestly feels that his need tops all others. Better highways will save lives, freight cars are needed for defense, hospitals need steel, etc. Unless we go over to complete government control—which Heaven forbid in peacetime—there is no sure way to rate the priority of the various claimants. If many school systems are like some I know of, they waited too long—despite warnings—before contracting for more space.—Ed.

Fringe Benefits

Sir:

We are interested in your comments on Fringe Benefits which are shown on page 37 of your February 2, 1956, issue of THE IRON AGE.

Could you supply us with the total list of benefits and advise us the methods of calculation; whether the cost per man hour is based upon hours paid or hours worked. *R. B. Williams, Controller, Hartford Steel Ball Co., Inc., Hartford 6, Conn.*

These costs are calculated on hours worked rather than hours paid because the Association felt this was a more true and constant measure. It is therefore based primarily on a 40 hour work week or slightly longer in a few instances. You will receive the complete report of all fringe benefits as compiled by Associated Industries of Cleveland.—Ed.

Ike's Decision

Sir:

Your editorial, "The President Needs Your Prayers," in a recent issue of THE IRON AGE concerning Pres. Eisenhower's decision on another term, was excellent—it concerned a problem which too few of us had considered.

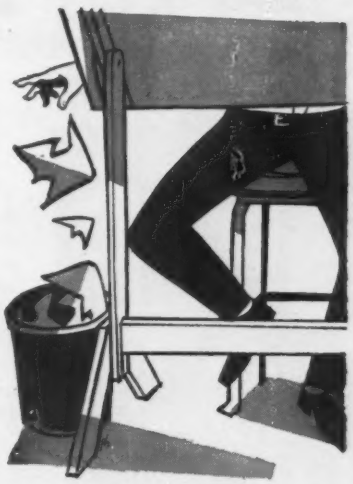
I passed it on to the Editor of the *St. Louis Post-Dispatch* and thought you'd be interested to see, from the enclosed, that he gave it prominent space in this outstanding newspaper. *R. D. Bardes, Vanadium-Alloys Steel Co., St. Louis, Mo.*

Vacuum Metals

Sir:

We have read your article on vacuum metals in the January issue of IRON AGE and find it most interesting. You have given us a very good summary of the current status of vacuum metallurgy. We were disappointed, however, not to find our name on the list of users of vacuum equipment. For something over one year we have been using a 50 lb vacuum furnace for both experimental and production melting. This furnace was manufactured by Geraetebau - Anstalt Balzers in Liechtenstein. *K. B. McCain, Chief Metallurgist, Wilbur B. Driver Co., Newark, N. J.*

Before You Give Up...



consider a ball

Your wastebasket knows how a design job is going . . .; "You're on the wrong track," it says when it looks like the one above. "You need a fresh approach."

"Maybe you should consider a ball . . ."

A *Universal* ball.

A Universal ball so tiny you can hardly see it. Or a Universal ball as big as a golf ball. There's a size for every need—including the *new* demands for today's new uses. For these days, designers and manufacturers are continually coming up with new products and new jobs for balls in every industry in the country.

From smallest to largest, Universal balls are as perfectly round as long experience, close quality control, and skillful workmanship can produce. Tolerances within 10-millionths of an inch. And we can supply just about any kind of metal you wish.

Next time your wastebasket starts working overtime, and you see where a ball might make an "impossible" job possible, call us in. Maybe we can help.

Universal Ball co.

WILLOW GROVE
MONTGOMERY CO., PA.

Guarantee TOP Performance and Maximum Life!

Specify THESE TOP QUALITY FEATURES...

(Standard on Miller Cylinders at no extra cost)

Specify CASE HARDENED CHROME PLATED PISTON RODS

On all Air and Hydraulic Cylinders

Benefits To You

CASE-HARDENED Piston Rods (52-54 Rockwell "C") provide practically complete protection against damage from hammer blows, wrench-dropping, mishandling, and similar occurrences. ***Available from Miller at no extra cost.***

The HARD CHROME PLATING over the case-hardened rods protects against scratch-damage and rust. ***Available from Miller at no extra cost.***

Specify "TEFLON" WIPERS

On all Air and Hydraulic Cylinders

Benefits To You

"TEFLON" Rod Wipers and "TEFLON" Hydraulic Piston Rod Seals withstand temperatures from—100°F. to plus 500°F. They are impervious to practically all known chemicals, including the fire-resistant, special, and standard hydraulic fluids in current use. ***Available from Miller at no extra cost.***

Specify TEFLON HYDRAULIC ROD SEALS

On all Hydraulic Cylinders

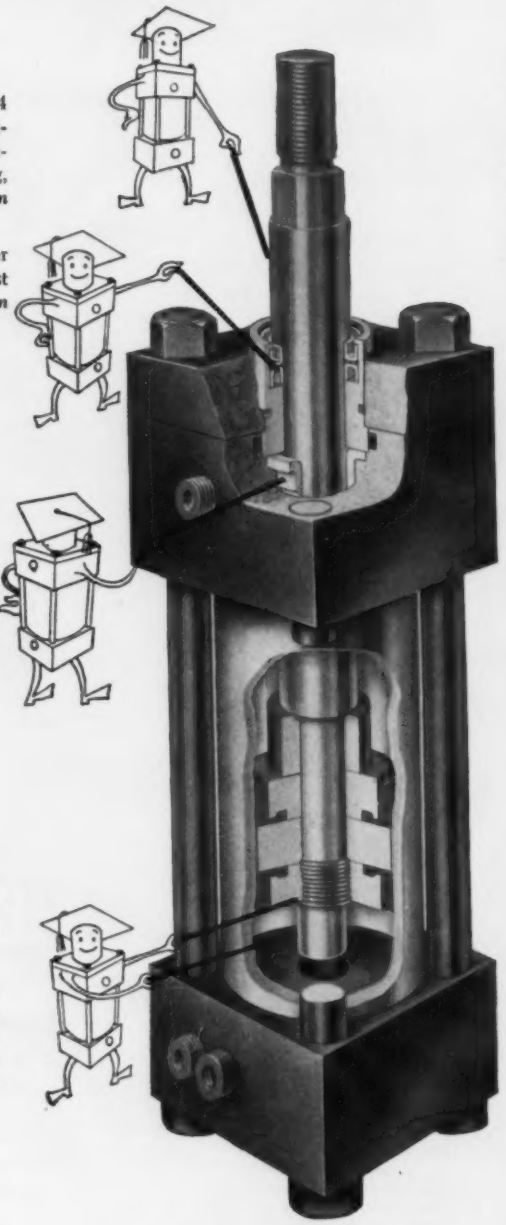
Specify RUST RESISTANT SURFACES

On all Air and Hydraulic Cylinders

Benefits To You

Highest quality Black Ferric Oxide Finish provides rust protection in air cylinder operation and on all cylinders during shipping and installation.

Cylinder heads, caps, mountings, pistons, followers, tie rods, and the unplated portions of the piston rods have this finish ***at no extra cost on all Miller cylinders.*** (This finish not recommended for water service)



You may wish to route this entire page to the proper department in your company, by using this handy form. Additional copies on request. →

To (Dept.)_____

"On all our future cylinder requirements, please specify the above quality features."

Signed_____

Title_____

See These New Features on Miller Cylinders at Miller

BOOTH #429

A. S. T. E. SHOW, March 19-23
International Amphitheatre, Chicago

SALES AND SERVICE FROM COAST TO COAST

CLEVELAND • YOUNGSTOWN • DAYTON • TOLEDO • CINCINNATI • COLUMBUS
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Miller

MILLER FLUID POWER CO.

2030 N. Hawthorne Ave., Melrose Park, Ill.

AIR & HYDRAULIC CYLINDERS • BOOSTERS • ACCUMULATORS
COUNTERBALANCE CYLINDERS

fatigue cracks

by William M. Coffey

La Lettres

Dear Bill Cafe:

Attaché est un article regardé THE IRON AGE. *Mon ami Bob Huart de le Belgium Consultate á New Orleans envoye pour moi.*

Escrivez s'il vous plait un paragraphé concernment la large numbre des amis qui lire THE IRON AGE *et respecter l'authorite de la papier.*

Merci beaucoup, Doney moi la plume. Il est an livre, etc., etc. Spell his name right will you for once and tell your readers (as of Mar. 3, there were 23) *that Belgium, French, all people read, understand and think and know* THE IRON AGE *is THE metalworking paper no matter where you are in the world.*

Aufweiderzien gehen zie noc hausen.

Sinceremont,
Tom Campbell

Some Linguist

Everybody knows that Tom is the Editor-in-chief of THE IRON AGE. But probably only a few intimate friends know that Tom is fluent in many languages. He is best in English (having been born and raised in this country. Sic—see Editorial) but as you can see, his French is tres belle, too. We, of course, are extremely fluent in French ourselves and we've studied and studied Tom's letter and can't find a single mistake. And do you know he has never been to a French restaurant or ate frogs? He picked it all up from the chapter headings of the English translation of Lee's Miserables, which is a story about the Confederate army.

. . . And in French or English, Tom is right. As a matter of fact bon ami Tom understated le case. His particular reference is to an article printed in a Belgium newspaper which quoted THE IRON AGE at length on the economic outlook.

. . . And these are facts: over 2,000 foreign industrialists pay up to $25 a year for IRON AGE and we didn't ask one of them to subscribe—all unsolicited. (Who knows how many readers? 10,000? 20,000?) Five overseas subscribers pay around $200 to receive their weekly copies air mail. Keep sending money. And send that much if you wish.

It just goes to show you to what lengths some people will go to keep informed on the latest developments in metalworking.

Puzzlers

Three embryo bank examiners came through for Mr. West and his problem about the tellers (Feb. 9 puzzler) and they all agree as does Mr. West that the number 2 teller goofed. Winners: A. A. Coffin, Jr., A. G. Becker & Co.; C. W. McKinley, Flint, Michigan, and Harold W. Leidy. Glenn Canfield, Jr., Allis-Chalmers, said it was number 3. Everybody agreed this was a time-consuming puzzler. We don't think, Mr. West, that at this late date any more answers will be forthcoming.

New Puzzler

Caleb Flerk said to his hired hand one day, "This bag of feed will last our flock of chickens for 15 days; but if we had 21 more chickens, and fed each chicken 2/3 as much as we are feeding them now, it would last only 12 days." How many chickens does Caleb have?

* * *

. . . And you might try these for luck.

1. What number represents the square root of a googolplex?

2. What are the *three* cube roots of unity?

Don't ever complain about not getting enough puzzlers. We'll fix it so that you won't get any work done.

it's SEYMOUR NICKEL SILVER of course!

Take a close look at one of the "scoops" — or hooks — in the slide fasteners which play a key role in your daily living.

The *best* slide fastener scoops are made of Seymour Nickel Silver flat wire. They are formed on high speed machines that produce up to 300,000,000 of these tiny parts every day. Yet, so precise is the operation that tolerances are held to half-thousandths of an inch!

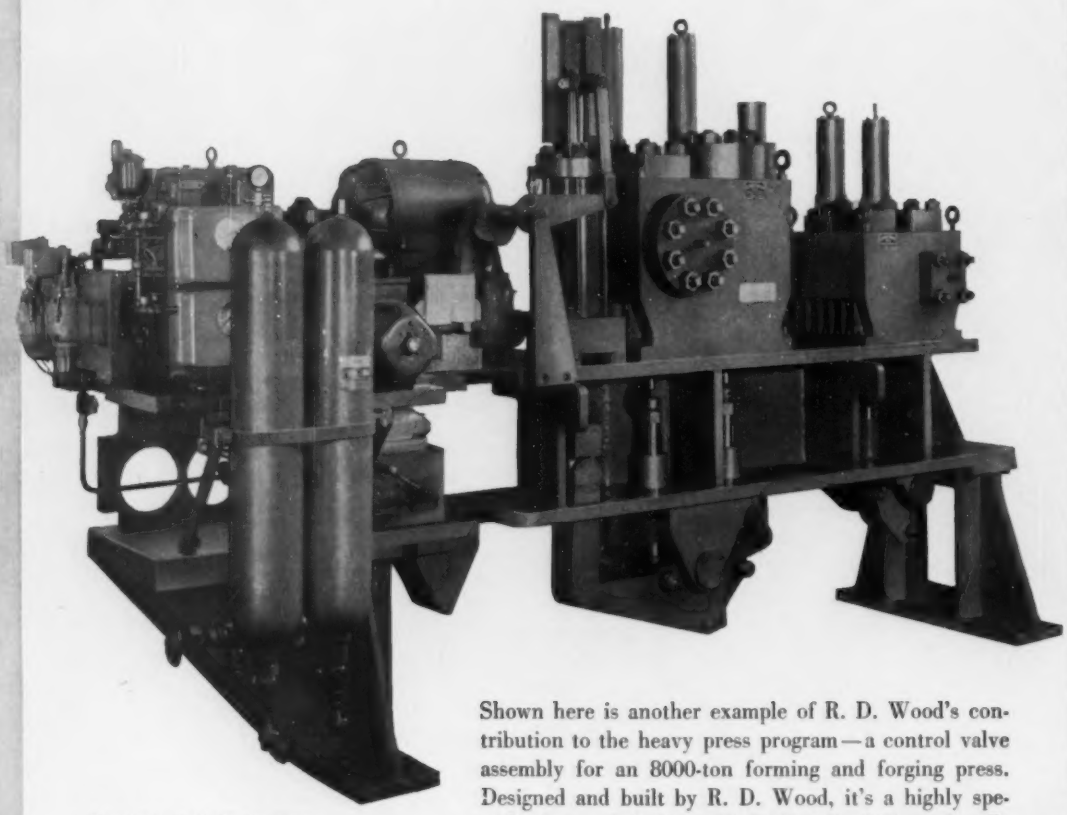
Because its uniform composition and temper enable it to undergo precise forming on high speed machines, Seymour Nickel Silver meets these requirements perfectly. It will not discolor materials — it is long wearing and corrosion resistant — it has the necessary eye appeal. Best of all, it has the *natural lubricity* which makes fasteners work smoothly and without sticking. These enviable qualities have helped make Seymour the leading supplier of nickel silver wire for the slide fastener industry.

Beyond that, Seymour's readiness to produce nickel silver alloys in strict conformity to users' needs has prompted many manufacturers to say . . . "SPECIFY SEYMOUR — You KNOW it's good!"

SEYMOUR

THE SEYMOUR MANUFACTURING CO.
2 Franklin Street, Seymour, Connecticut

Big help in heavy press program



Remote electro-hydraulic servo control valve assembly. Length is 14 feet; height 9 feet.

Shown here is another example of R. D. Wood's contribution to the heavy press program—a control valve assembly for an 8000-ton forming and forging press. Designed and built by R. D. Wood, it's a highly specialized type. It indicates R. D. Wood's ability to handle the most difficult valve engineering and manufacture.

Other standard R. D. Wood high-pressure hydraulic valves include stop, operating, check, relief, and safety types. Since 1803, the name R. D. Wood has stood for superior products. Write for details on R. D. Wood high pressure hydraulic valves for every purpose.

R. D. WOOD COMPANY

PUBLIC LEDGER BUILDING • PHILADELPHIA 5, PENNSYLVANIA

Representatives in Principal Cities

dates to remember

MARCH

NATIONAL ASSN. OF WASTE MATERIAL DEALERS, INC.—43rd annual convention, March 11-13, Waldorf-Astoria Hotel, New York. Society headquarters, 271 Madison Ave., New York.

INTERNATIONAL ACETYLENE ASSN.—56th annual convention, March 12-14, Statler Hotel, Los Angeles. Society headquarters, 30 East 42nd St., New York.

NATIONAL ASSN. OF CORROSION ENGINEERS — National conference and exhibition, March 12-16, Hotel Statler, N. Y. Society headquarters, 155 E. 44th St., N. Y.

EXPOSITIONS

ASTE—Industrial exposition, March 19-23, Chicago.

MATERIALS HANDLING SHOW, June 5-8, Cleveland.

ASSN. OF IRON & STEEL ENGINEERS, Sept. 25-28, Cleveland.

METAL SHOW—Oct. 8-12, Cleveland.

PRESSED METAL INSTITUTE—Annual spring technical meeting, March 14-16, Hotel Carter, Cleveland. Society headquarters, 3673 Lee Rd., Cleveland.

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS — Spring meeting, March 18-21, Multnomah Hotel, Portland, Ore. Society headquarters, 29 W. 39th St., New York City.

STEEL FOUNDERS' SOCIETY OF AMERICA — Annual meeting, March 19-20, Drake Hotel, Chicago. Society headquarters, 606 Terminal Tower, Cleveland.

FARM EQUIPMENT INSTITUTE—13th industry-research conference, March 28-29, Cornell University, Ithaca, N. Y. Society headquarters, 608 S. Dearborn St., Chicago.

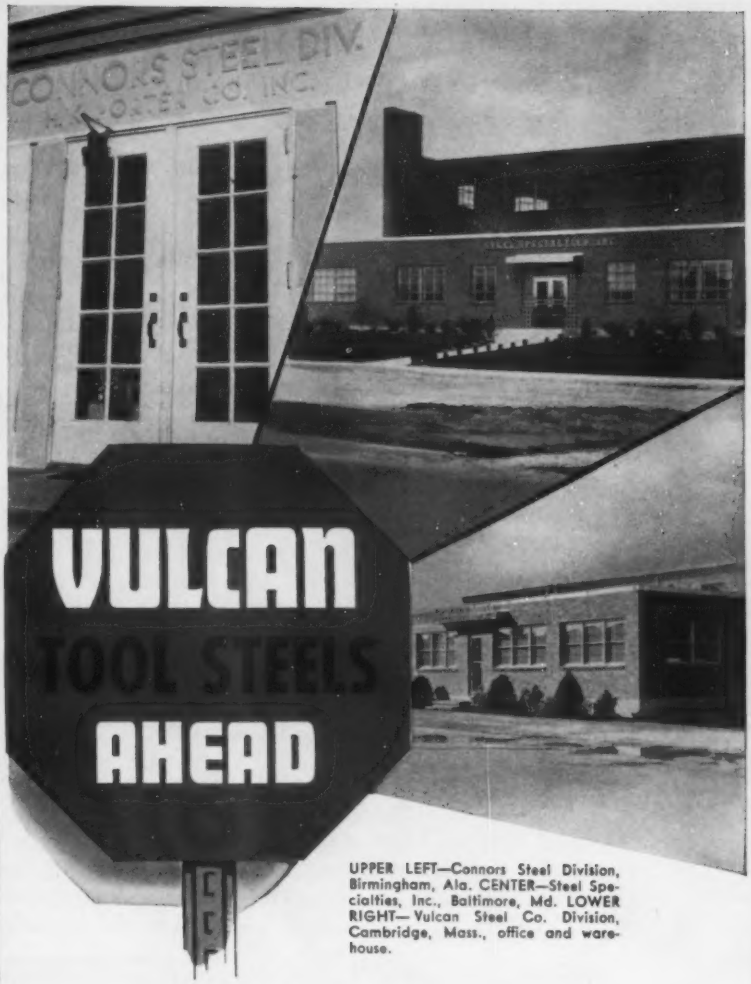
APRIL

MATERIALS HANDLING INSTITUTE—Spring meeting, April 3, Edgewater Beach Hotel, Chicago. Society headquarters, 813 Clark Bldg., Pittsburgh.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.—Annual spring engineering conference, April 4-6, Lehigh University, Bethlehem, Pa. Society headquarters, 101 Park Ave., New York.

AMERICAN SOCIETY OF LUBRICATION ENGINEERS — Annual meeting and lubrication exhibit, April 4-6, William Penn Hotel, Pittsburgh. Society headquarters, 84 E. Randolph St., Chicago.

METAL POWDER ASSN. — 12th annual meeting, April 10-12, Cleveland Hotel, Cleveland. Society headquarters, 420 Lexington Ave., New York.



UPPER LEFT—Connors Steel Division, Birmingham, Ala. CENTER—Steel Specialties, Inc., Baltimore, Md. LOWER RIGHT—Vulcan Steel Co. Division, Cambridge, Mass., office and warehouse.

improving service to you

Additional sales and distribution outlets—in key areas—mean VULCAN Tool Steels are *directly* ahead of you.

The big advantage is that you will find it easier to obtain the exceptionally high quality tool steels produced by VULCAN. VULCAN's emphasis on *forging* adds assurance of high quality.

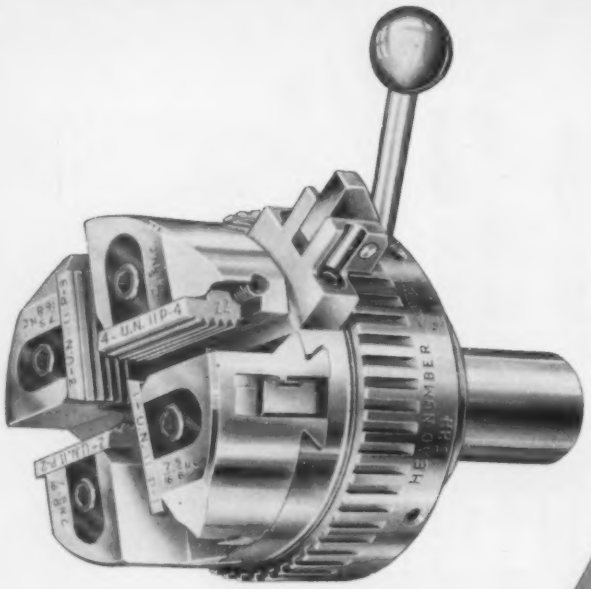
Your end result is the finest tools and dies you can make.

VULCAN Tool Steels are available in all types, shapes and sizes. See your nearby VULCAN representative, or write for VULCAN Tool Steel Data bulletin, with your representative's location.

Vulcan Crucible Steel Co. Division

HKP

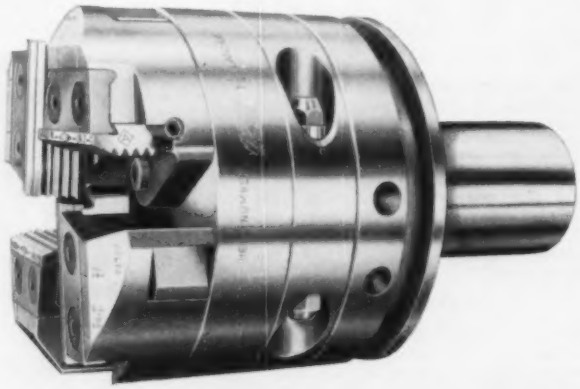
H. K. PORTER COMPANY, INC.
Aliquippa, Pennsylvania
Offices in Pittsburgh, New York, Cambridge, Baltimore, Birmingham, Detroit, Lansing, Chicago, Milwaukee, St. Louis.



for Class 4 and 7 tolerances
HARDENED-AND-GROUND Die Heads

2

..... maximum



for Class 2 and 3 tolerances
HEAT-TREATED Die Heads

LANDIS *Machine* COMPANY
WAYNESBORO • PENNSYLVANIA • U. S. A.

These
THREADING
TOOLS
displayed
at Booth 578
ASTE Show

445-C

styles of LANDIS Die Heads

PRECISION or ECONOMY

"Threading Efficiency" requires the selection of the proper die head for the job to be done, and is the essence of LANDIS design. To ensure that you may use the most efficient threading tool, LANDIS manufactures Die Heads in two basic styles:

HARDENED-AND-GROUND HEADS should be used where a high degree of thread-cutting accuracy is required. Their fundamental design and the inherent qualities of specially selected and hardened materials provide the maximum rigidity necessary for threading to Class 4 and Class 7 tolerances.

HEAT-TREATED HEADS are designed for the utmost economy when doing commercial threading, and will produce threads to Class 2 and 3 fits. The initial cost is small and rugged construction ensures trouble-free operation and few repairs. Wide range coverage requires minimum tool inventories, and along with the use of LANDIS Tangential Chasers allows maximum output per dollar of tool cost.

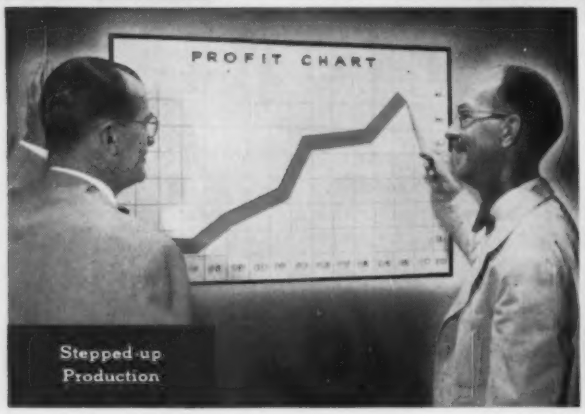
LANDIS Tangential Chasers are an important factor both in the economy and precision of these basic head styles. These chasers may be replaced or reground singly, will thread all diameters of the same pitch and form, and can be used for 80% of their original length. Their basic design minimizes stress and distortion, and allows either style of die head to produce threads of the accuracy for which it is recommended.

LANDIS manufactures more than 100 sizes and styles of standard and special Die Heads for use on threading machines, turret lathes, tapping machines and bar automatics. Let us suggest the Head most suitable for *your* needs—send specifications and ask for Bulletins F-80 and F-90.

THE WORLD'S LARGEST MANUFACTURER OF THREADING EQUIPMENT - CUTTING - TAPPING - GRINDING - ROLLING

448-C

ANTISEP the all-purpose water-soluble cutting base



Cool Profits...when ANTISEP works for you!

Cooler, faster, cleaner cutting . . . longer tool life and less rejects . . . these are the things that make machine tools pay off in extra profits.

With *Antisep* All-Purpose Base on the job, you start collecting dividends right away—

. . . **it's inexpensive.** Because Antisep Base is cut 25 to 1, or more, with water, it costs less than 8c a gallon in the machine.

. . . **tools last longer.** Antisep's tough film and speedy water cooling keep tools and work cooler than any straight cutting oil could. Cases on record show tool life increased 12 times and more!

. . . **production increases.** Antisep Base's high lubricity withstands pressure and reduces friction. Machines can be run faster—rejects are reduced.

Put Antisep Base to the test on the toughest jobs in your plant. Check the results yourself and increase the profits from your machining operations. Call your Houghton Man today or write direct to E. F. Houghton & Co., 303 West Lehigh Avenue, Philadelphia 33, Pa.

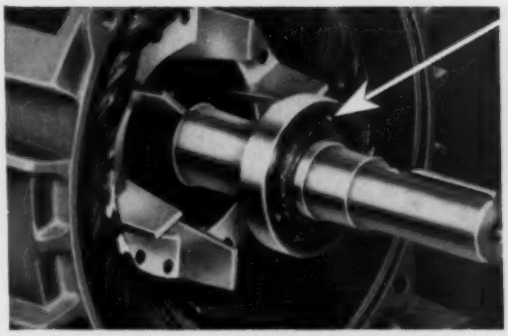
ANTISEP all-purpose cutting base

. . . a product of

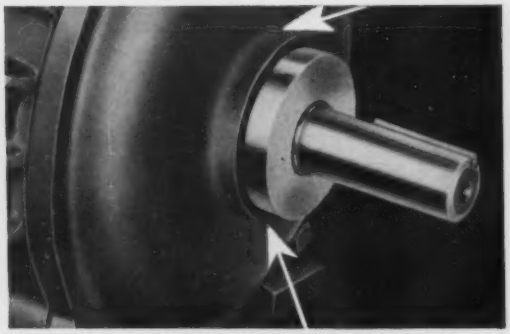
E. F. HOUGHTON & CO.
PHILADELPHIA · CHICAGO · DETROIT · SAN FRANCISCO

Ready to give you on-the-job service . . .

Wagner ELECTRIC MOTORS...the choice of leaders in industry

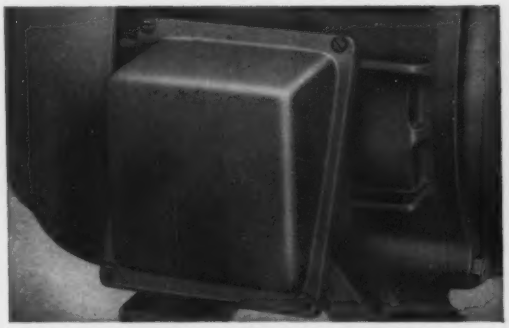


HEAVY-DUTY BALL BEARINGS—Highest quality bearings of more than ample capacity to carry heavy loads provide long trouble-free service.



BEARINGS CAN BE RE-LUBRICATED—These Wagner motors can be re-lubricated when necessary to prolong bearing life. New grease can be added—old grease removed through openings provided in top and bottom of bearing housing.

BEARINGS STAY CLEAN—Both ends of these motors are equipped with running shaft seals to keep dirt, dust and water from the bearings. There's no grease loss because bearing housings have effective seals to prevent escape of grease.



EASY TO CONNECT—Large diagonally-split conduit box which can be mounted in any of four convenient positions, provides ample room for making connections. Leads are readily identified by numbers stamped on the terminal bushing.

Wagner totally-enclosed motors mean less down-time for machine tools

New NEMA Frames Standard and Explosion-Proof

Wagner totally-enclosed fan-cooled motors are particularly suitable for use on all types of machine tools.

They are fully protected against damage from steel filings, chips, dust, dirt, fumes and moisture. They require no maintenance other than periodic lubrication.

If appearance is a factor, you'll find that the pleasing proportions of these motors give them that functional beauty obtained only when the design is fundamentally *right*.

Ribs on the corrosion-resistant cast iron frames add mechanical strength and increase the surface area for more efficient cooling. Full information and principal dimensions are given in Bulletin MU-203 which is yours for the asking.

Your nearby Wagner engineer can help you select the right motor for your applications. Call the nearest of our 32 branch offices, or write us.

Wagner Electric Corporation
6403 Plymouth Ave., St. Louis 14, Mo., U. S. A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

M56-7

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS–AIR AND HYDRAULIC

Expensive parts machined to close tolerances are always in danger of being scratched by jagged chips hiding in the weave of ordinary wiping material. Parts so damaged have to be reworked . . . sometimes scrapped entirely.

This wiping job could cost $50

They're easy to distribute . . .

They really soak up oil . . .

Always a clean one handy . . .

Just toss 'em in the trash . . .

When you use Scott Wipers, chips don't come back to scar men and metal . . . there's always a clean new wiper handy. You use one thoroughly and throw it away. No more expensive collection, sorting, laundering and distribution.

. . . this one cost less than ½¢

The Difference is . . . Scott Wipers

Strong, highly absorbent Scott Wipers can be used and reused. Yet they cost so little you can throw them away after a single use when the job calls for a clean wiper, free of chips and abrasive material.

Scott Wipers are reducing the cost of wiping in many companies. Sorting and baling are eliminated. Handling and distribution are simplified. Laundering becomes a thing of the past.

This is sanitary wiping. A man uses a Scott Wiper thoroughly, throws it away—takes a new one. No danger of cuts from hidden chips . . . no fear of skin infection from dirty wipers.

Put the Scott Wiper through its paces on your production line. Your local Scott representative or distributor is ready to demonstrate any time you say. Call today or mail this coupon.

SCOTT PAPER COMPANY
Dept. W-1, Chester, Pa.
Please send me more information about Scott Wipers.

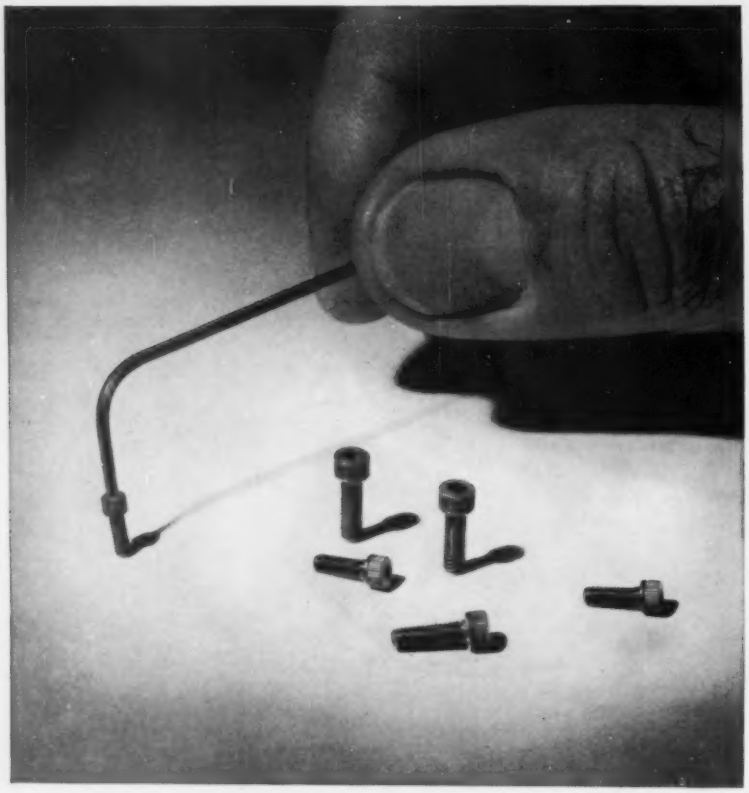
Name_____

Company_____

Position_____

Address_____

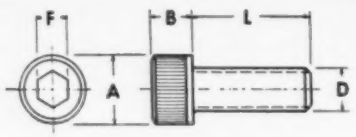
Miniature screws aid standardization of small devices



Standard UNBRAKO miniature socket head cap screws are available in sizes #0, #1, #2 and #3, in heat treated alloy steel or stainless steel, at your authorized industrial distributor's. Standard lengths range from ⅛ to ½ in.

HEAT-TREATED ALLOY STEEL

Class 3 Fit Standard



	Diameter	Threads per Inch NC	Threads per Inch NF	Length	Recommended Installation Torque in Inch-Pounds NC	Recommended Installation Torque in Inch-Pounds NF	Weight per 1000 in Pounds
#0	A .104		80	⅛		2.0	.152
	B .060		80	3/16		2.0	.182
	D .060		80	¼		2.0	.210
	F .050		80	⅜		2.0	.265
#1	A .118		72	⅛	3.5	3.5	.27
	B .073		72	3/16	3.5	3.5	.32
	D .073		72	¼	3.5	3.5	.37
	F .050		72	⅜	3.5	3.5	.47
#2	A .140	56		3/16	6.0	6.0	.42
	B .086	56		¼	6.0	6.0	.50
	D .086	56		⅜	6.0	6.0	.58
	F 1/16	56		½	6.0	6.0	.70
#3	A .161	48		3/16	8.5	9.5	.59
	B .099	48		¼	8.5	9.5	.70
	D .099	48		⅜	8.5	9.5	.81
	F 5/64	48		½	8.5	9.5	1.03

Tiny close-tolerance Unbrako screws available in standard sizes

New economies in the design of space-saving miniature equipment are possible with these UNBRAKO miniature socket head cap screws. Manufactured to timepiece precision, available locally, they save the costly necessity of designing special screws to fasten tiny parts in compact units. They're ideal for use in typewriters, calculators and computers, servomechanisms, electric and electronic equipment—and in countless other small, intricate devices where maximum reduction in bulk and weight is required with no sacrifice in strength of individual components or assemblies.

Fingers grip the knurled heads on these tiny screws positively for easy handling and fast assembly. Uniform hex sockets assure maximum wrenching torque. Controlled fillets under the heads prevent shearing of the heads. Threads are fully formed for maximum strength and exact fit. Extremely accurate head diameters permit their use in countersunk holes, saving weight by reducing the length of the screw required and making flush designs possible.

These standard UNBRAKO miniature screws are available at your authorized industrial distributor's. See him today. Or write us for Bulletin 2055 and samples. Unbrako Socket Screw Division, STANDARD PRESSED STEEL Co., Jenkintown 17, Pa.

See us at Booth 479—ASTE Show

Standard Screws are threaded to the head. Special materials, lengths, and threaded lengths are available. One "High-Titan" UNBRAKO hex key is included with each package of 100 screws.

UNBRAKO®

SOCKET SCREW DIVISION

STANDARD PRESSED STEEL CO.

SPS

JENKINTOWN PENNSYLVANIA

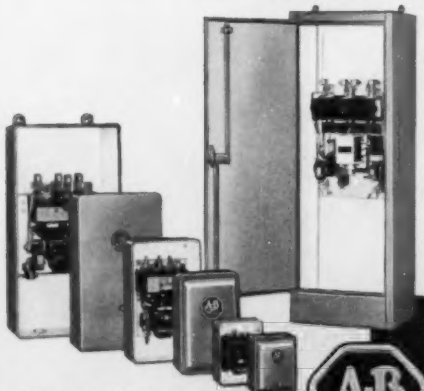
ALLEN-BRADLEY SOLENOID CONTACTORS HAVE SILVER ALLOY CONTACTS
NEVER CLEAN, DRESS OR FILE THEM
EVEN THOUGH CONTACTS APPEAR PITTED AND BURNED OR ARE ENTIRELY BLACK, THEY WILL GIVE SATISFACTORY OPERATION
CONTACTS NEED REPLACEMENT ONLY WHEN THE SILVER ALLOY HAS BEEN WORN AWAY
A-B
ALLEN-BRADLEY CO.

Left—Allen-Bradley Size 7 solenoid contactor used in large solenoid starters.

Below—Allen-Bradley Size 7 solenoid starter with overload relays in NEMA Type 1 general purpose, floor mounted enclosure.

ALLEN-BRADLEY SOLENOID STARTERS USE DOUBLE BREAK, SILVER ALLOY CONTACTS THROUGHOUT!

Eight Sizes up to 300 hp, 220 v; 600 hp, 440-550 v.



Bulletin 709 solenoid starters shown here in Sizes 0 to 6—all equipped with accurate and reliable overload relays.

All starter manufacturers use the solenoid construction and double break, silver alloy contacts for their lower starter ratings, because experience has proved this construction superior to any other. Therefore, wouldn't this experience repeat itself with the higher rated starters?

Allen-Bradley has found this to be absolutely true. Its starters of high hp rating are regularly establishing new standards of starter performance. As you go from size to size, the operating characteristics remain the same—you get trouble-free, long-life performance.

Standardize on Bulletin 709 solenoid starters—they are Tops in Quality!

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

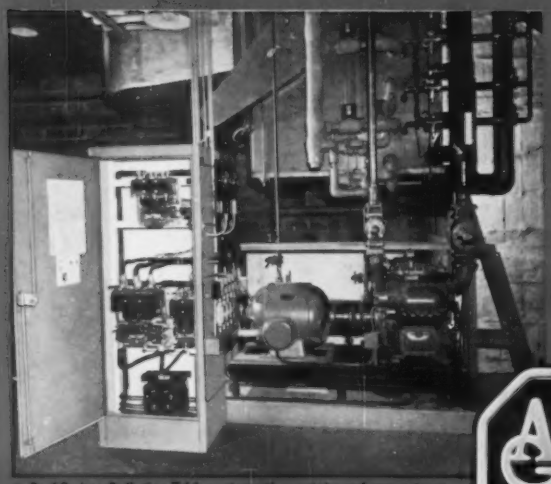
3-56-MR

A-B Quality

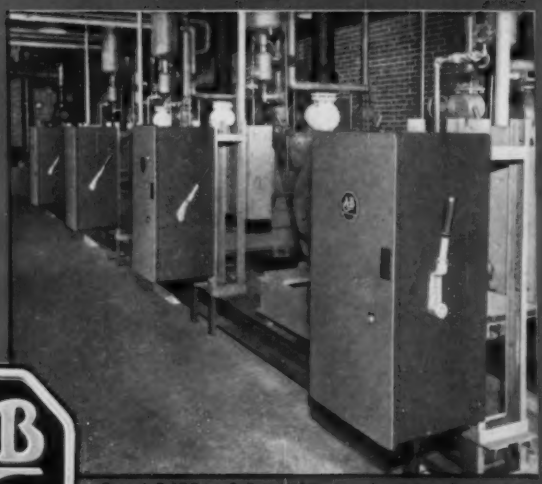
ALLEN-BRADLEY

SOLENOID STARTERS

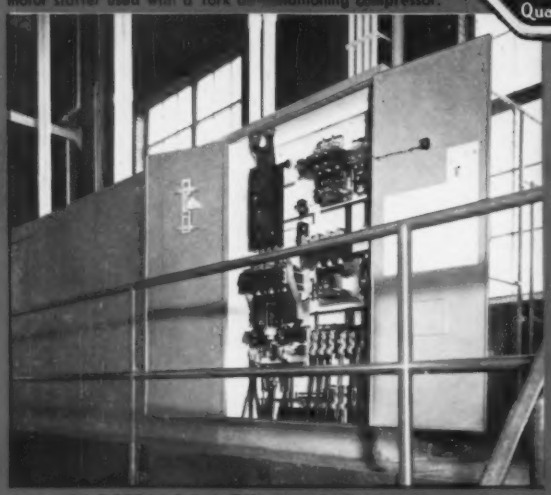
QUALITY



A-B 60 hp Bulletin 746 automatic autotransformer-type motor starter used with a York air-conditioning compressor.



Four A-B 125 hp Bulletin 646 manual autotransformer-type motor starters used with refrigeration compressors in a dairy.

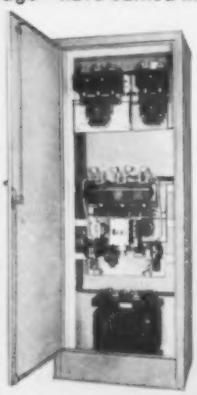


A row of A-B 350 hp Bulletin 761 automatic slip-ring motor starters with circuit breaker disconnects in the Milwaukee sewage disposal plant.

Allen-Bradley Bulletin 798 multi-unit control center used with motors ranging from 10 to 75 hp installed in a southern fruit food plant.

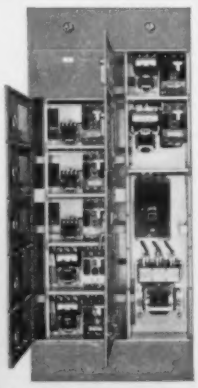
ALLEN-BRADLEY STARTERS FOR LARGE A-C MOTORS ARE AS POPULAR AS THE BULLETIN 709 SIZE 1 FOR SMALL MOTORS

Allen-Bradley manual and automatic starters for large squirrel-cage, slip-ring, and synchronous motors—both high and low voltage—have earned the same reputation for "Quality" for which the lower ratings are known. Every operating requirement can be satisfied, either with individual units or as sections of a multi-unit control center.



A-B automatic autotransformer, reduced voltage starter with cabinet open to show control panel.

Allen-Bradley high voltage starters are rated up to 1500 hp with voltages ranging from 2000 to 4600 volts. The high voltage, synchronous motor starters are self-protecting against short circuits up to 250,000 kva on 2501-4600 volts, 3 phase, 60 cycles. Oil or air break switching available. Please write for the Handy Catalog.



A-B multi unit control center with compartment doors open to show various types of motor controls.

Allen-Bradley Co., 1316 S. Second St., Milwaukee 4, Wis.
In Canada—Allen-Bradley Canada Ltd., Galt, Ont.

ALLEN-BRADLEY
SOLENOID STARTERS
QUALITY

3-56-MR

EASY WAY TO PUT OUTPUT ON THE UPSWING!

shift lubrication methods from

Backward to *Forward!*

ALEMITE AIR-OPERATED TRANSFER PUMP

gives 63% faster lubricant transfer

...saves right down the line!

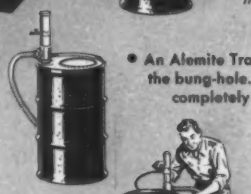
The *real cost* of plant lubrication is not just the *lubricant* alone! Actually, it's the time and labor needed to get the lubricant *out* of the original drum—*into* a bucket pump or powergun—and then *applying* it to machine bearings. That's where the real costs add up!

And that's why an Alemite Air-Operated Transfer Pump can cut costs in your plant—especially if you are using old-fashioned hand methods of lubrication. It transfers 37 pounds of pressure gun grease *per minute*—direct from the original drum—completely sealing the lubricant at all times—protecting against mess, waste and contamination.

It's fast—and versatile! It can even handle alcohol, cutting oils, kerosene—almost any non-corrosive non-abrasive fluid you use by the drum. Delivers light fluids at a rate of up to 15 gallons per minute!

There's no better way to speed up your handling of lubricants—because an Alemite Transfer Pump pays for itself by saving man-hours and machine-hours as well!

• A 400-pound barrel of lubricant arrives at the plant—sealed, fresh, "refinery clean."



• An Alemite Transfer Pump is inserted in the bung-hole. It is threaded to fit—completely reseals the barrel.

• In less than a minute a 25-pound bucket pump is filled! No contamination, no air pockets, no mess or waste!

• Now the bucket pump is ready to service hundreds of hungry bearings with lubricant that is protected all the way from barrel to bearing!

FREE! New Booklet:
"5 Plans for Better Lubrication"
Alemite, Dept. N-36, 1850 Diversey Pkwy.
Chicago 14, Illinois
Please send me my FREE copy of "5 Plans for Better Lubrication."

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

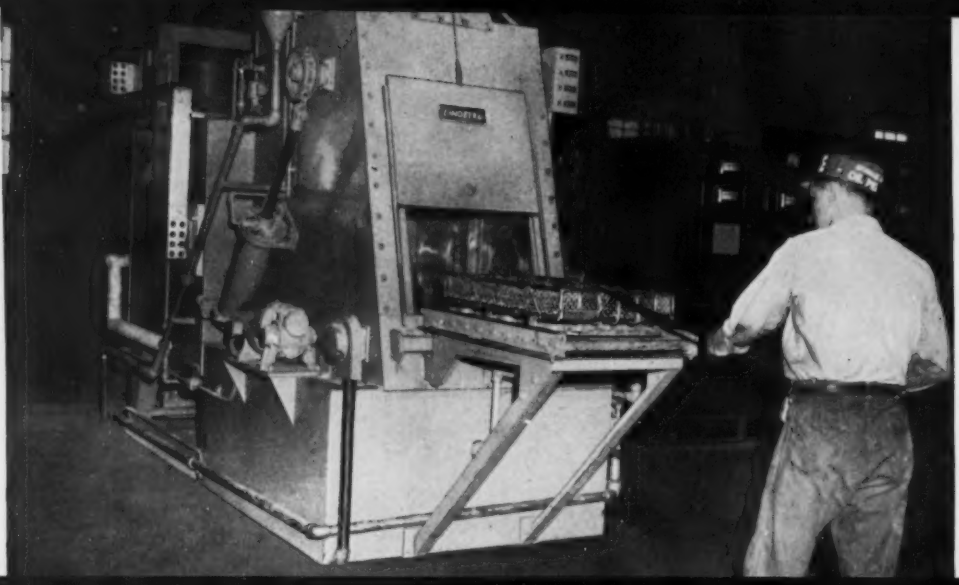
ALEMITE

Ask anyone in industry

A PRODUCT OF SW STEWART WARNER

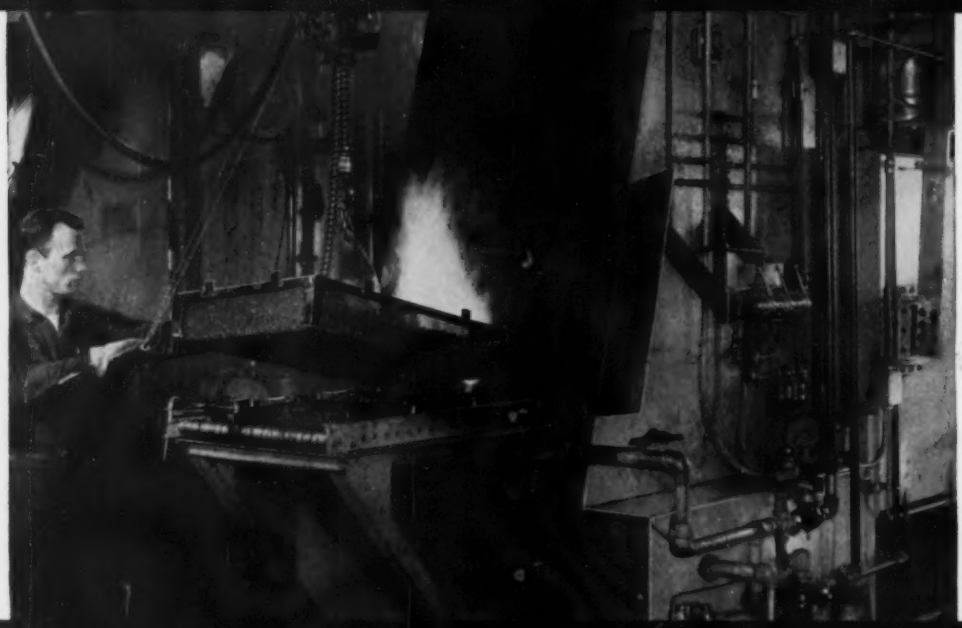
ALLIED

New Lindberg electric furnace with CORRTHERM element at Allied Metal Treating Corporation, Kenosha, Wisconsin. This furnace is used 24 hours a day, 6 days a week, for carbonitriding, clean hardening pinion gears, hardening crank shafts after carburizing and carburizing small gears and shafts.



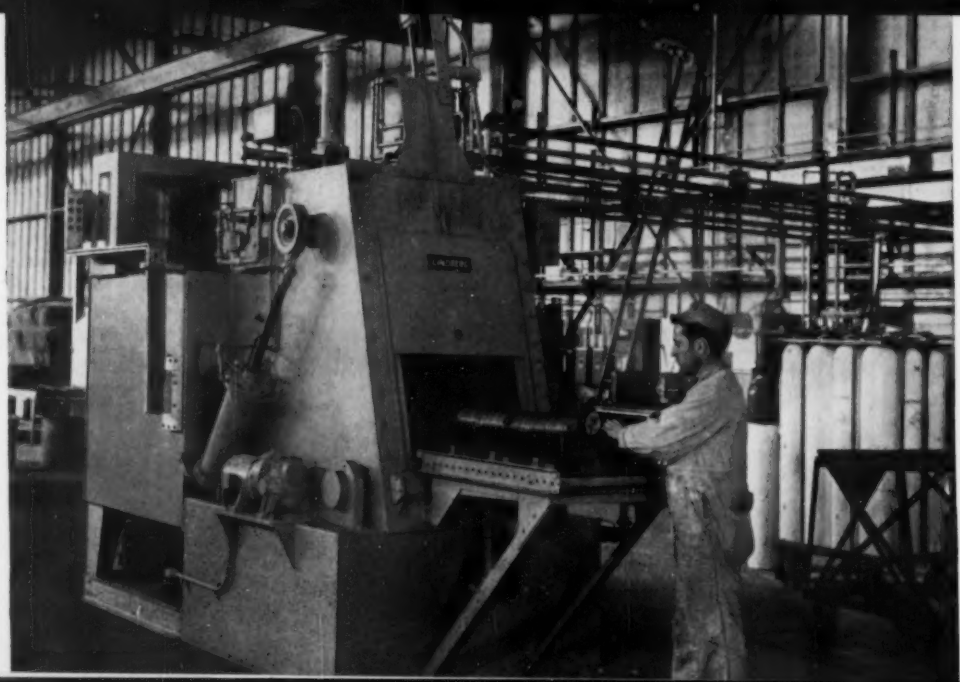
EKLUND

Installation of new Lindberg furnace with CORRTHERM electric element at Eklund Metal Treating, Inc., Rockford, Illinois. Furnace used 24 hours a day, 7 days a week, for carburizing gears and machine tool parts, carbonitriding sheet metal screws and automotive parts, and hardening and tempering bolts.



PERFECTION

Lindberg electric furnace with CORRTHERM element just installed at Perfection Tool & Metal Heat Treating Company's Lombard, Illinois plant. This furnace is being used 24 hours a day, 6 days a week, for carbonitriding and carburizing parts for automotive and farm implement industries.



COMMERCIAL HEAT-TREATERS QUICK TO ADOPT LINDBERG ELECTRIC CARBONITRIDING FURNACES WITH NEW CORRTHERM HEATING ELEMENT

It is significant that commercial heat-treaters, always in the lead in the acceptance and development of better heat-treating methods, have been among the first to appreciate the revolutionary advantages of Lindberg's newly announced CORRTHERM electric heating element.

Recent Lindberg CORRTHERM-equipped furnace installations in plants of three leading midwestern commercial heat-treaters are shown on the opposite page.

Where electricity is the preferred source of heat Lindberg furnaces with CORRTHERM provide to the fullest degree the versatility and dependability required in efficient commercial heat-treating. Ideal for carbonitriding, they are readily applicable to other processes—carburizing, carbon restoration, bright hardening or annealing, and normalizing.

Whether your heat-treating operations are commercial or captive, large or small, the CORRTHERM element in Lindberg electric furnaces offers you these exclusive advantages:

Low voltage—operates at extremely low voltage. No leakage through carbon saturation.

Atmosphere Circulation—elements act as baffle to direct circulation of convection streams.

Safety—extremely low voltage eliminates shock or short hazards.

Durability—watts density at all time low. Element practically indestructible.

This shows how the new Lindberg CORRTHERM electric heating element fills the furnace with walls of glowing heat. Note also that CORRTHERM is conveniently hung from simple brackets requiring no complicated connections or construction.

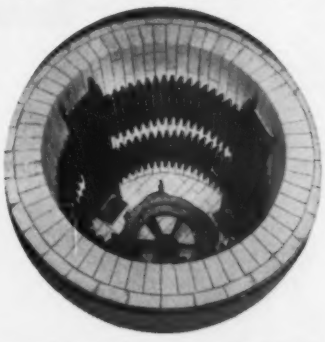
CORRTHERM is an exclusive Lindberg development created in Lindberg laboratories by Lindberg metallurgists and engineers. To find out how its advantages can be applied to your heat-treating processes consult your nearest Lindberg Field Representative. (Look in classified phone book.)

LINDBERG ENGINEERING COMPANY

2452 West Hubbard Street, Chicago 12, Illinois

Los Angeles Plant: 11937 Regentview Ave., at Downey, California

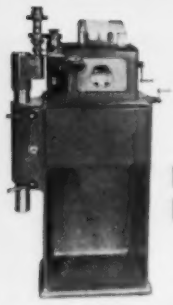
Installation of CORRTHERM elements in one of two large rotary furnaces just erected in the field by Lindberg's associate company, Lindberg Industrial Corporation.



Installation of Lindberg CORRTHERM-equipped carburizing pit-type furnace in plant of Lindberg Steel Treating Co., Melrose Park, Ill.

Safety! Extremely low voltage makes CORRTHERM elements completely safe. Let operator or work load bang it if they will. Neither element nor operator will be hurt.

WORTH THEIR



Fellows
Red Liners

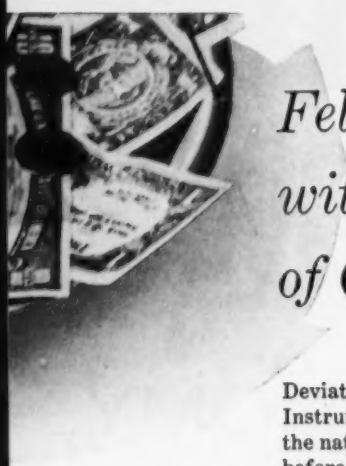
Fellows
Lead Measuring
Instruments

Fellows
Involute Measuring
Instruments

SEE FELLOWS
AT THE ASTE SHOW
—BOOTH 544
International Amphitheatre
CHICAGO
MARCH 19th - 23rd

THE
PRECISION
LINE

WEIGHT IN PROFITS



Fellows Gear Inspection Instruments with Chart Recorded Proof of Gear Accuracy

Deviations of the "red line" on a chart from a Fellows Gear Inspection Instrument, not only warn of costly gear errors—but indicate the nature of that error. Proper adjustments can thus be made immediately before expensive rejects accumulate in long production runs.

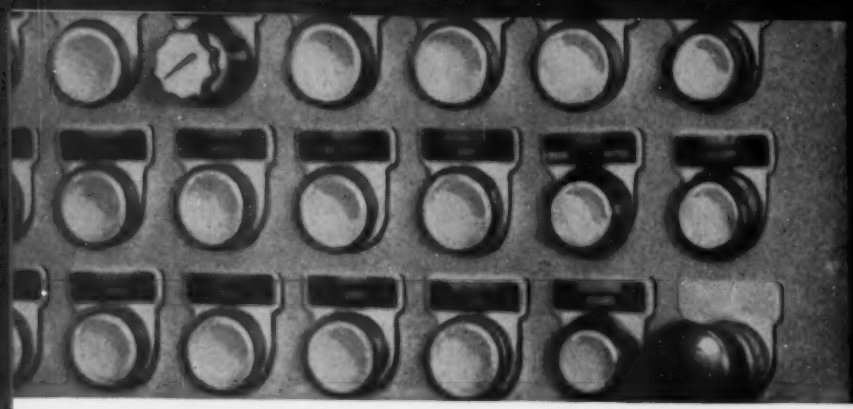
The use of Fellows Gear Inspection Instruments to continually "spot check" gears keeps waste of time, labor and materials to a minimum... provides undeniable chart recorded proof of gear accuracy... guarantees superior performance for the life of your product.

- **For composite check,** FELLOWS RED LINERS record gear errors in combination on a chart as the precision master rotates in intimate contact with the gear being checked. 3 models to 18" p.d.
- **For checking lead,** FELLOWS LEAD MEASURING INSTRUMENTS check various leads—also crown and taper. No involved calculations required. Errors charted by an electronic recorder at 500 to 1 magnification. 12", 24" p.d. models.
- **For checking involute profiles,** FELLOWS INVOLUTE MEASURING INSTRUMENTS check accuracy of involute profiles—also location of involute modifications. Electronically provide charts at 500 to 1 magnification. 12", 24" p.d. models.

There's a Representative in any Fellows office who will be glad to show you how to operate Fellows Inspection Equipment...and just how, in your operation—Fellows Gear Inspection Instruments can be "worth their weight in profit".

THE FELLOWS GEAR SHAPER COMPANY
78 River Street, Springfield, Vermont
Branch Offices: 319 Fisher Building, Detroit 2
5835 West North Avenue, Chicago 39
2206 Empire State Building, New York 1
6214 West Manchester Avenue, Los Angeles 45

Fellows *Gear Production Equipment*



PUSH-BUTTON ECONOMY

Yesterday, Jones & Lamson broke through the speed barrier with high-velocity metal turning.

Today, advanced engineering at Jones & Lamson again pioneers in attacking a critical cost consideration: the *man-hour* factor.

Here are a few of the engineering innovations which are strategically important for (1) minimizing operator fatigue and human error (2) speedy change-over and retooling, and (3) push-button simplicity of operation:

In Turret Lathes: Geneva saddles and Hydra-Clutch headstocks; automatic thread chasing; one- or two-way tracing combined with normal Turret Lathe operation; Numerical Tape Control for Automatic Turret Lathe.

In Automatic Lathes: Automatic handling; feed-back; gaging; sorting; chip disposal.

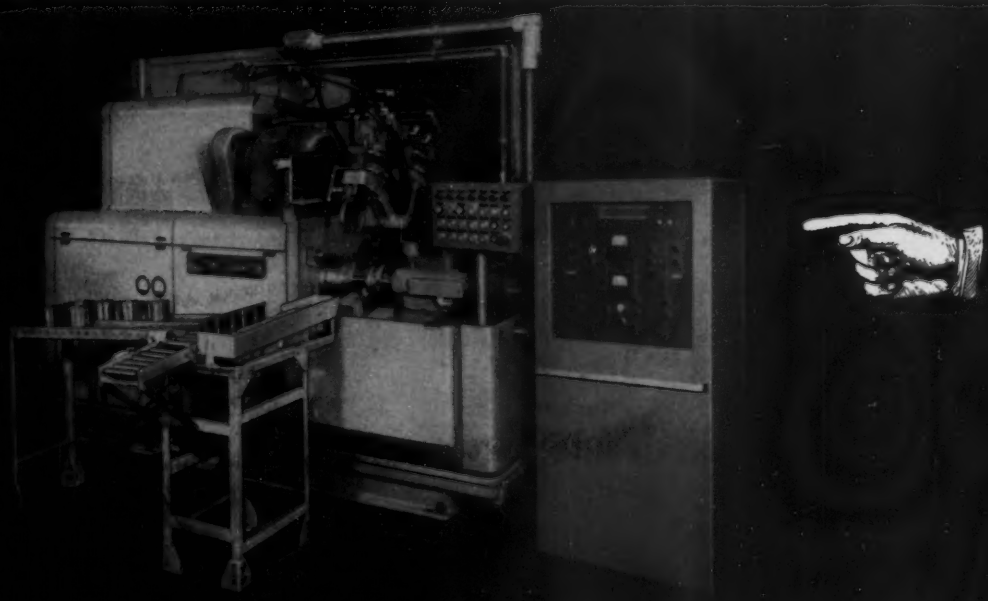
In Grinders: Automatic Tap Grinders; Optical Contour Grinders; automatic handling for Thread and Form Grinders.

These are typical results of our all-out efforts toward machine design that will reduce costs, increase production, and keep both operators and management happy.

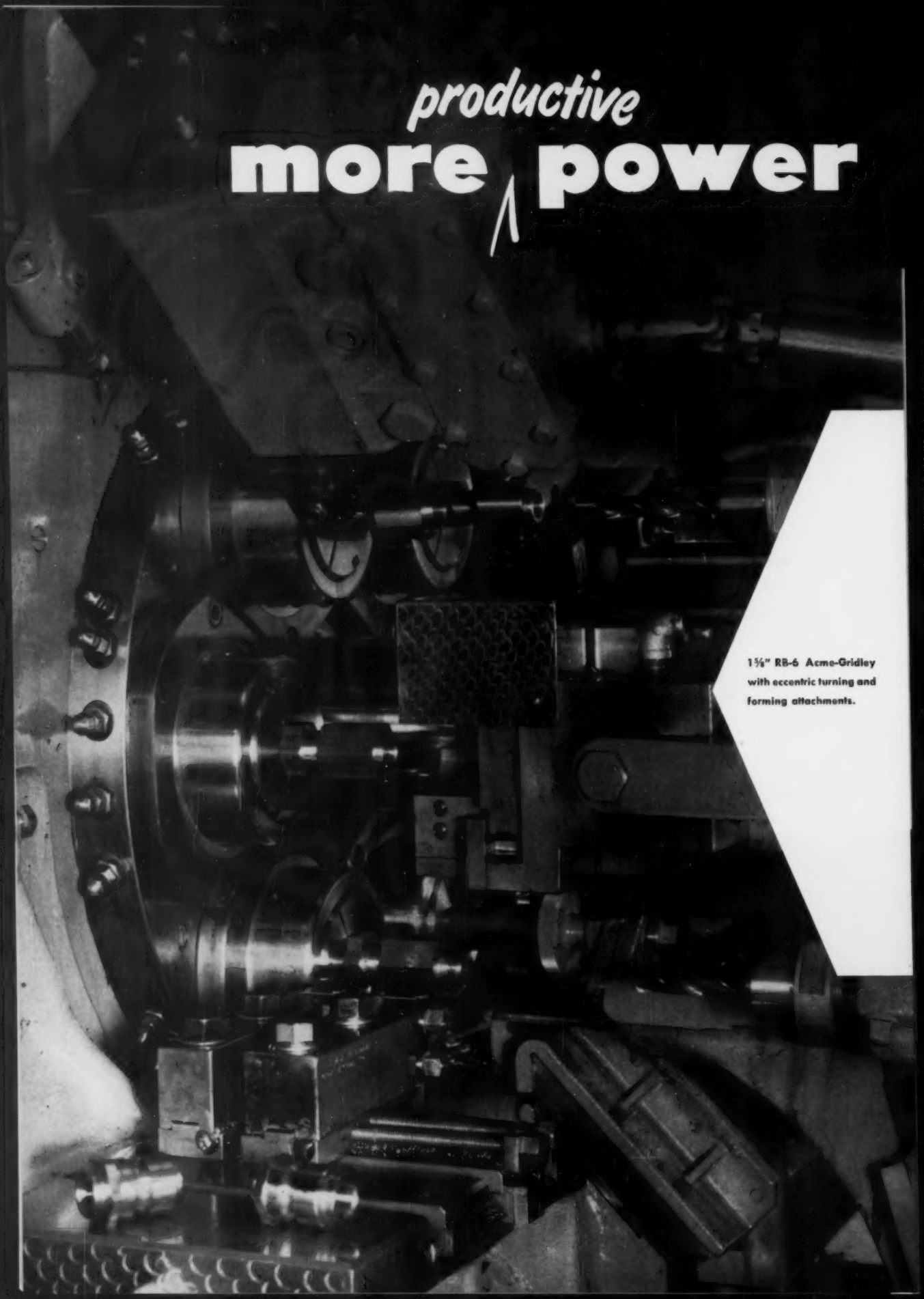
The man who needs a new machine tool is already paying for it.

JONES & LAMSON MACHINE CO • 511 CLINTON ST • SPRINGFIELD, VT.

Turret Lathes *Fay Automatic Lathes* *Milling & Centering Machines* *Thread & Form Grinders* *Optical Comparators* *Threading Dies & Chasers*



more productive power



1⅛" RB-6 Acme-Gridley with eccentric turning and forming attachments.

to you!

Acme-Gridley independently-operated direct cross-slide camming

Lets you use maximum machine horsepower for rapid metal removal—without chatter and at predetermined accuracy—throughout an entire run. Basic design of Acme-Gridleys built for heavy cuts calls for proper distribution of "beef" in the machine frame to rigidly support top, bottom and intermediate slides so that they can transmit power to the tip of the tool with no linkages.

Cross slides operating from their own cam drums not only improve overall machine efficiency, but extend the range of applications for which the machine can be tooled. And when, as in the case of Acme-Gridleys, ample frame strength is combined with short coupled power transmission to the tool, you've got a combination that pays off in two ways—improved performance and reduced maintenance.

LET US TELL YOU MORE ABOUT
***Acme-Gridley* BASIC DESIGN**

Independently-operated, direct camming is but one of many BASIC DESIGN features which are responsible for Acme-Gridley's outstanding performance records. May we send you additional information? Or, better yet, let us send a representative to discuss possible production short cuts with you.

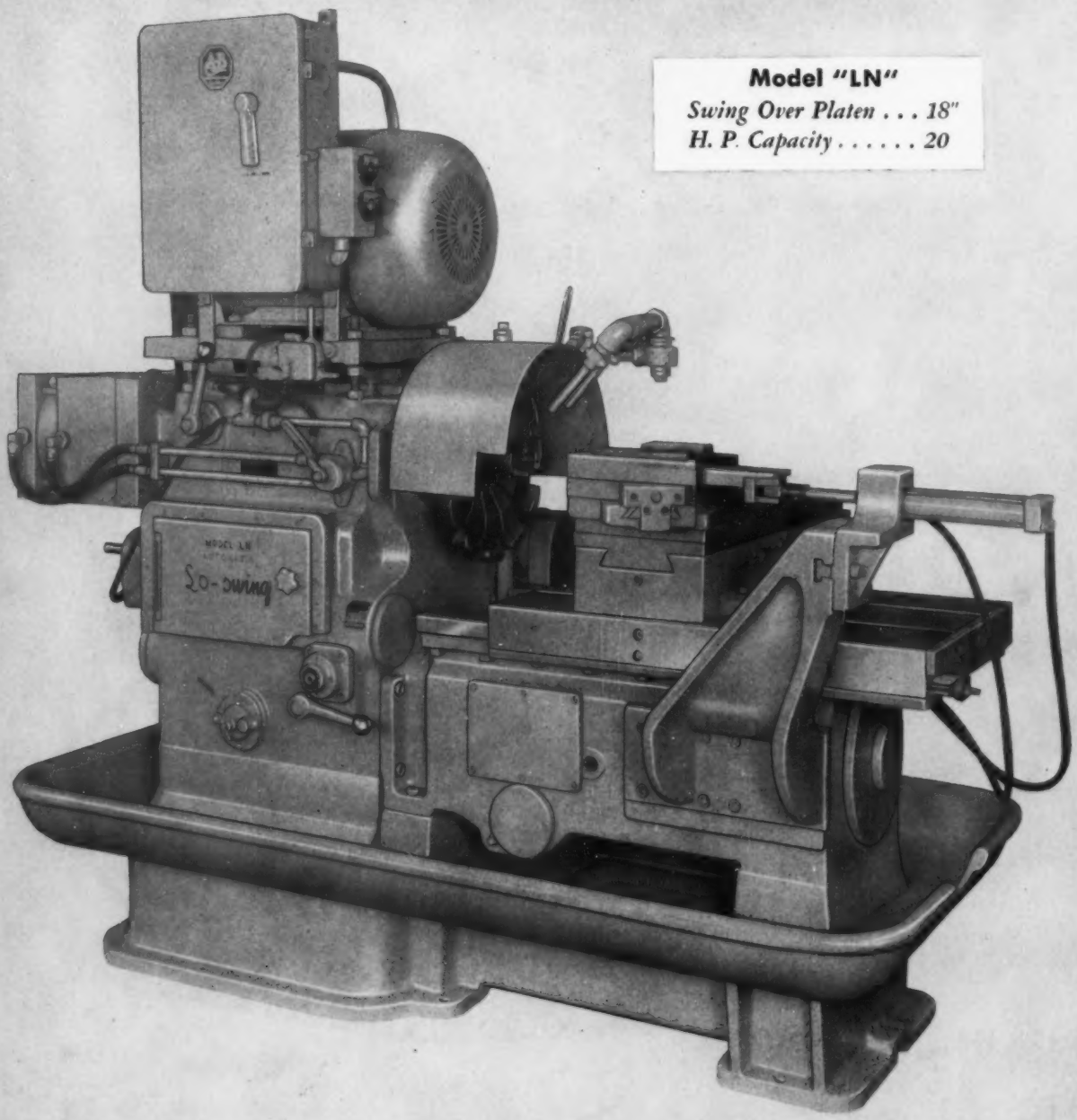
National Acme

THE NATIONAL ACME COMPANY, 175 EAST 131ST STREET, CLEVELAND 8, OHIO

SALES OFFICES: • Newark, N. J. • Chicago, Ill. • Detroit, Mich.

MACHINE OF

PREPARED BY THE SENECA FALLS MACHINE CO. "THE *Lo-swing* PEOPLE" SENECA FALLS, NEW YORK



Model "LN"
Swing Over Platen . . . 18"
H. P. Capacity 20

SENECA FALLS PLATEN-TYPE,

THE MONTH

NEW PLATEN-TYPE AUTOMATIC LATHES CUT BORING, FACING AND TURNING COSTS

The NEW Seneca Falls Platen-Type Automatic Lathes have been designed principally as chucking machines adaptable to a wide variety of work requiring large swing capacity, high spindle speeds, multiple tooling and fast cycling operation.

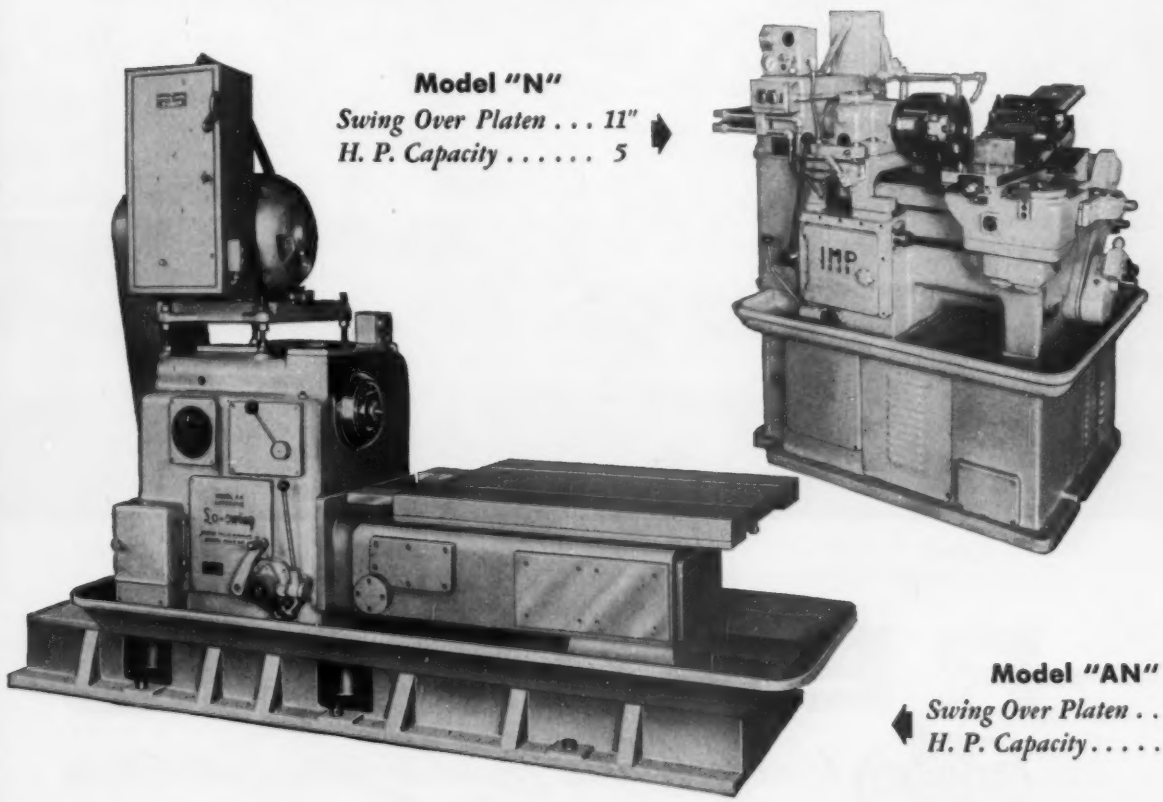
The platens have cam operated longitudinal and cross feeds and may be equipped with angular feeding slides and other special attachments suitable for customer's work.

All three types of machines may be equipped with Seneca Falls Automatic Loading and Transfer Equipment which provides means to extend automaticity to individual machines or through a series of successive, though dissimilar, operations to combine work loading, machining and work transfer into one single, automatically controlled phase of production flow.

Seneca Falls production-minded engineers are at your disposal to solve your chucking problems.

Write for Bulletin N-F

Model "N"
Swing Over Platen . . . 11"
H. P. Capacity 5



Model "AN"
Swing Over Platen . . . 24"
H. P. Capacity 40

CAM-OPERATED AUTOMATIC LATHES

REPUBLIC COLD

EXCELLENT MACHINABILITY of Republic's cold drawn steel helps Stanley Tools achieve uniform high quality in each Yankee Screw Driver spiral milled shaft. In addition, the cold drawing process produces marked improvement in the physical properties of any given analysis . . . including higher ultimate strength, yield point and hardness.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

DRAWN STEEL

Backs "Yankee's" Ingenuity

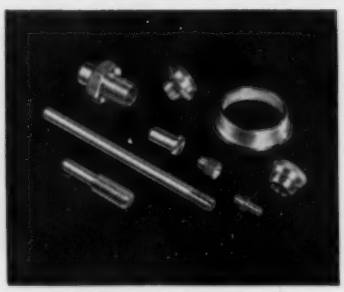
Fine materials are an absolute must in the manufacture of the ingenious "Yankee" Spiral Ratchet Screw Driver. And that's why Republic Cold Drawn Steel is used for the heart of the unit, the precision, spiral milled shaft.

This is the part that bears the brunt of the operation . . . converting a push into a twist . . . making fastening jobs easier and quicker. It is vital in maintaining "Yankee's" world-wide reputation for dependable, trouble-free operation.

Years ago, Yankee Tools, Inc., now a division of Stanley Tools, selected Republic as their steel supplier for this critical application. Their decision was based on Republic's ability to furnish cold drawn bars of precise size and cross section, excellent physical properties and a high degree of machinability. The continuing success of the "Yankee" Spiral Driver is ample evidence of the wisdom of this choice.

Your Republic representative or Union Drawn Distributor is prepared to work with you in developing or improving your product using cold drawn steel bars or shafting. He can offer you a complete range of carbon, alloy and stainless analyses in all standard shapes and sizes. Or you can investigate the possibilities of securing major savings through the use of special sections. Contact him today. Mail the coupon for full information.

OTHER EXAMPLES OF THE RIGHT STEEL IN THE RIGHT PLACE INCLUDE...



TOUGH, DURABLE, PUMP PARTS shown here are made of Republic ENDURO® Stainless Steel, Type 416. Its free-machining properties permit cutting speeds up to 85% of standard Bessemer screw stock. In addition, it offers good corrosion-resistance, very high physical properties, and is hardenable. For full information, mail coupon today.

THIS BEARING RETAINER for a connecting rod assembly proved extremely difficult to machine. However, Republic metallurgists and machining specialists worked with the manufacturer to secure volume production using Republic Cold Drawn Alloy Bars. Their uniform machinability extended tool life and produced both the fine surface finish and strength required.

RATCHET DOGS for this wrench are simply short lengths cut from a Republic Cold Drawn Special Section. The result is a great saving in machining plus improved physical properties in the parts. Investigate the possibility of using special sections in your product. Your savings may be enormous. Send coupon for complete data.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
Dept. C-1196
3104 East 45th Street
Cleveland 27, Ohio

Please send me further information on the following Republic Union Cold Drawn Steels:

☐ Carbon ☐ ENDURO Stainless Steel
☐ Alloy ☐ Special Sections

Name_____

Company_____

Address_____

City_____ Zone____ State_____

"Operations Kingsbury" – another way of saying

Drilling holes for lubrication in a rocker arm malleable iron casting is not exactly a *precision* job . . . *but the holes must go thru!* And high production is also a *must*.

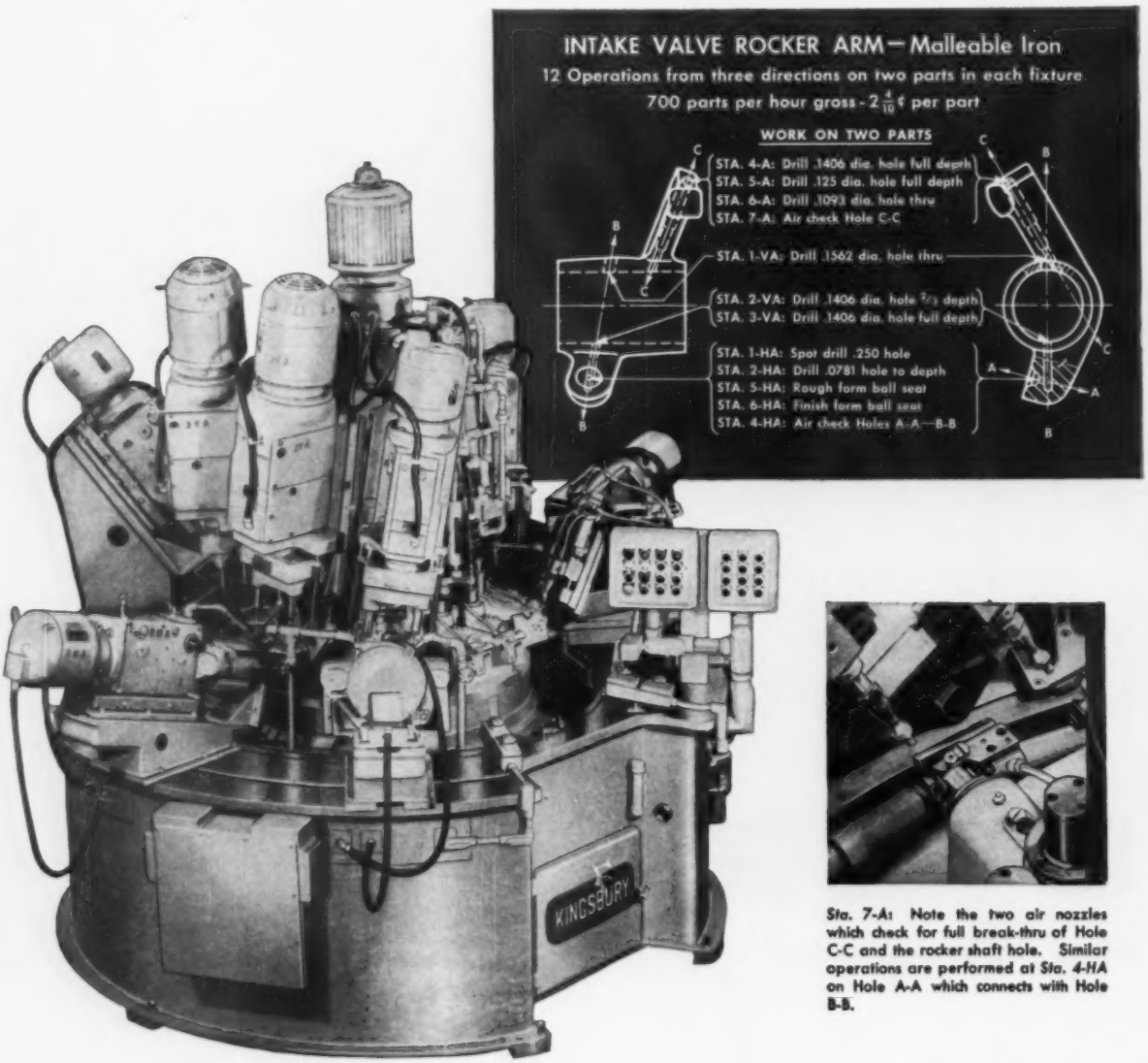
The part required four holes and a ball socket, developed at angles as shown on the print below. To obtain the highest practicable output, we used multiple spindle heads to perform identical operations on two parts at each station. Each work-holding fixture secured two parts in position so that all holes could be completed at the correct angles in one chucking.

Seven work units are mounted on a 100-inch base. Eight twin work-holding fixtures are mounted on a 40-inch table, which indexes through 8 stations – one for loading and unloading. The central column is stationary. Machine includes coolant pump and chip tank assemblies.

Holes B-B and C-C are drilled in three stages so as to minimize "loafing time" at any station. At Hole B-B, *Sta. 1-VA* drills into the rocker shaft hole. At *Stas. 2-VA* and *3-VA*, a bushing, assembled into the shaft hole stud, guides the drill accurately across this break-thru. Hole C-C is drilled at *Stas. 4-A, 5-A and 6-A*. At *Stas. 1-HA, 2-HA, 5-HA and 6-HA*, units drill Hole A-A and form the ball socket.

To make sure that Hole C-C breaks through into the shaft hole, it is air-checked at *Sta. 7-A*. The junction of Holes A-A and B-B is air checked at *Sta. 4-HA*. Back pressure stops the machine.

The customer got exactly what he wanted: high production at low cost per part.


INTAKE VALVE ROCKER ARM—Malleable Iron
12 Operations from three directions on two parts in each fixture
700 parts per hour gross - 2 4/10¢ per part
WORK ON TWO PARTS
STA. 4-A: Drill .1406 dia. hole full depth
STA. 5-A: Drill .125 dia. hole full depth
STA. 6-A: Drill .1093 dia. hole thru
STA. 7-A: Air check Hole C-C
STA. 1-VA: Drill .1562 dia. hole thru
STA. 2-VA: Drill .1406 dia. hole 5/8 depth
STA. 3-VA: Drill .1406 dia. hole full depth
STA. 1-HA: Spot drill .250 hole
STA. 2-HA: Drill .0781 hole to depth
STA. 5-HA: Rough form ball seat
STA. 6-HA: Finish form ball seat
STA. 4-HA: Air check Holes A-A—B-B
KINGSBURY

Sta. 7-A: Note the two air nozzles which check for full break-thru of Hole C-C and the rocker shaft hole. Similar operations are performed at Sta. 4-HA on Hole A-A which connects with Hole B-B.

"OK in every way" for low-cost, high production

Here's another Kingsbury machine with several unusual features. Print called for eight countersunk holes, spaced equally around a flange. To insure smooth seating, these holes had to be burred. This required an operation from the back of the part.

The machine has an 80-inch base with four work units. The 26-inch table has five work-holding fixtures and indexes through five stations — one for loading and unloading.

The part is located on a horizontal mandrel through the axis hole, and is clamped in position by means of two fingers, 180° apart. These fingers are operated by an equalizing cam: they clamp and unclamp automatically. Each Kingsbury head has 8 spindles, and all operations are performed horizontally.

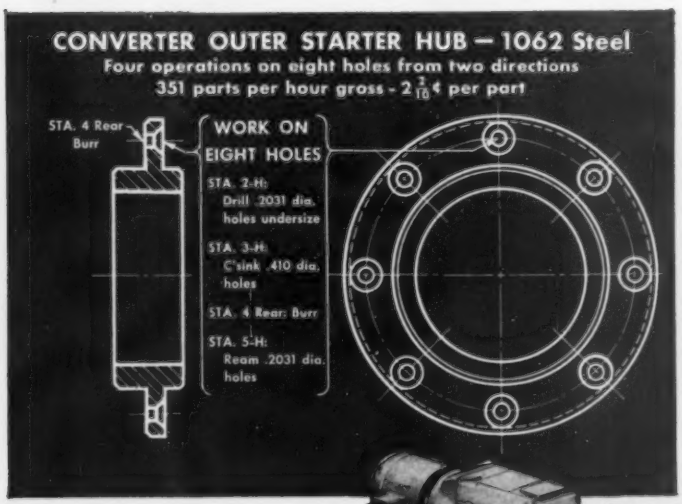
The eight holes are burred at *Sta. 4 Rear.* Here an auxiliary eight-spindle unit is supported by a bridge extending across the table.

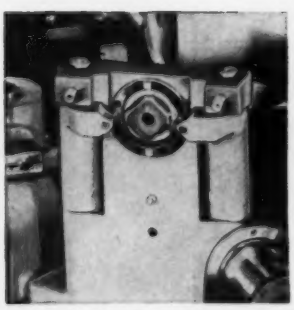
* *

Kingsbury heads, and fixtures, working as a team, can perform an amazing number of multiple operations. Case history after case history proves that this team work is a prime reason why Kingsburys, built here in Keene, develop accuracy and high production at low cost per part.

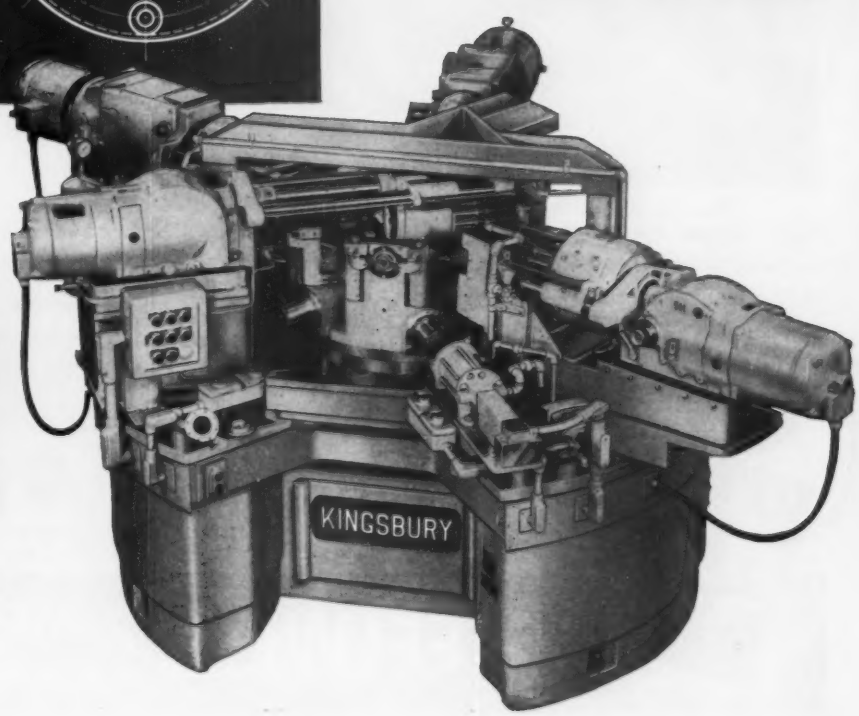
Today there are many more reasons why a Kingsbury might quickly pay for itself in your production line. Let's talk it over.

Kingsbury Machine Tool Corp.
116 Laurel St., Keene, N. H.


CONVERTER OUTER STARTER HUB — 1062 Steel
Four operations on eight holes from two directions
351 parts per hour gross - 2 3/10¢ per part
STA. 4 Rear Burr
WORK ON EIGHT HOLES
STA. 2-H: Drill .2031 dia. holes undersize
STA. 3-H: C'sink .410 dia. holes
STA. 4 Rear: Burr
STA. 5-H: Ream .2031 dia. holes



Fixture at *Sta. 5* where it is loaded and unloaded. Note the fingers which clamp the part firmly against the face of the fixture.



TOE CONTROL ELIMINATES KNEE ACTION

ELECTRIC FOOT SWITCH REDUCES FATIGUE - SPEEDS SHEARING

● The operator can slide the switch around the floor to wherever handiest to use. A mere touch of the toe and the knife is set in motion. Electric toe control is standard on all Steelweld Shears and furnished at no extra cost. It enables shearing speeds not attainable with ordinary foot treadles for many cutting operations.

● If you have spent a day at a shear with the old mechanical foot treadle, you know what knee action is. As the hours roll by it grows more and more tiresome, fatiguing, and production slips accordingly.

At last something has been done about it. Electric foot switches have been adopted as standard equipment for Steelweld Shears. Knee action has been replaced by fast easy toe control.

Toe control is one of many outstanding features you get on Steelweld Shears. These machines are in a class by themselves. Learn what they can do for you.

GET THIS BOOK!

CATALOG No. 2011 gives construction and engineering details. Profusely illustrated.

THE CLEVELAND CRANE & ENGINEERING CO.

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STEELWELD PIVOTED BLADE SHEARS

NOW...

an EXTERNALLY WRENCHED SCREW

that can be used in *standard*
counterbored holes with *standard* wrenches

THE FERRY CAP

countr-bor®

SCREW

For counterbored or other socket head screw applications, external wrenching instead of internal wrenching means:

- **More gripping surface**
- **More torque**
- **More savings**

TRY THEM—

Save knuckles—save time—save costs.

Solve simply the tough assembly problems and improve appearance where socket screws are required.

Send for samples.

You'll receive prices, complete information and samples promptly upon request.

Any type socket wrench handle with standard 12-pt. socket is used for counterbored applications.

Ferry Cap Countr-Bor Screws
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THE FERRY CAP & SET SCREW COMPANY
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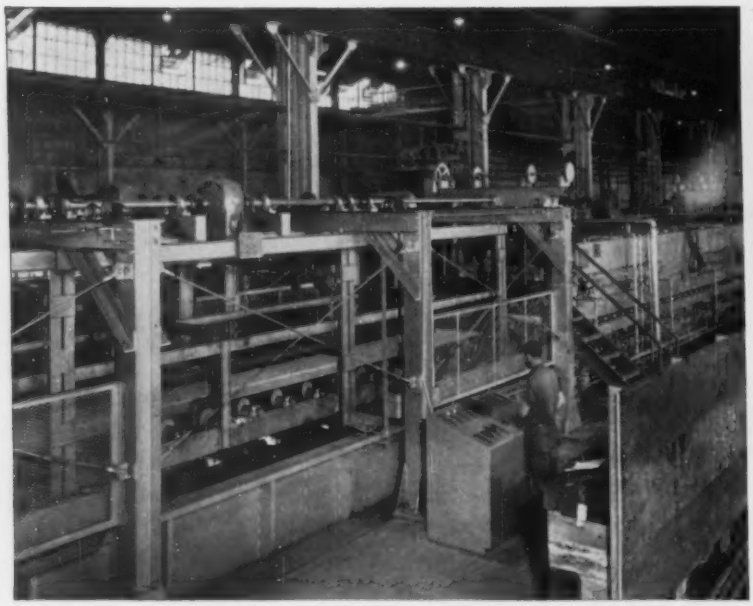
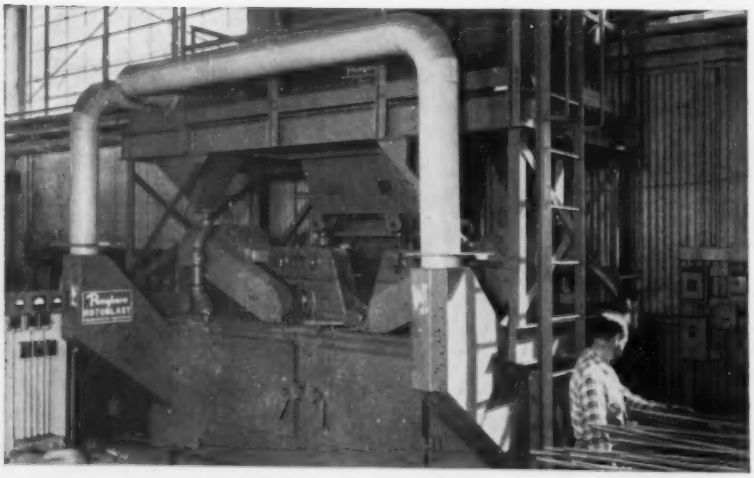


THIS batch-type, roller-hearth annealing furnace lends itself to the kind of flexibility Rotary needed. Photo at right shows operator preparing a charge at entry end.

Stainless Specialty Mill Highlights Trend at Rotary Electric Steel

Selling more finished bar product is Rotary's aim in this latest growth move. New annealing furnace handles wide range of bars from ½" to 4⅜" and coils of wire.



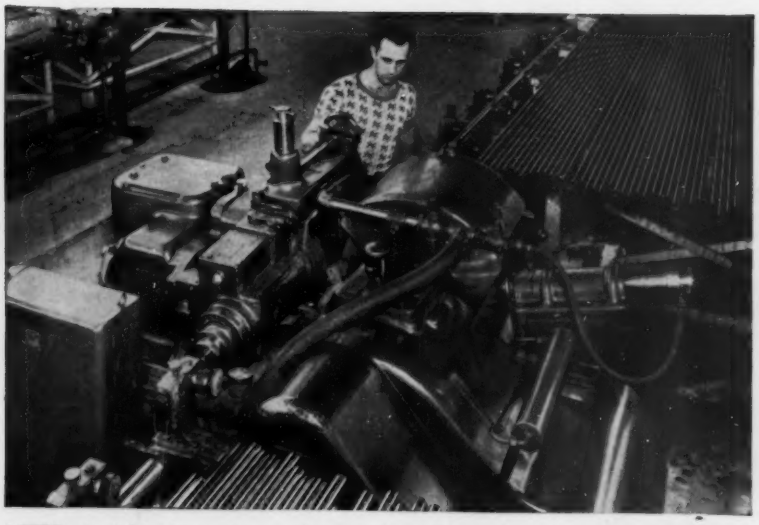
FIRST step in the new finishing department is descaling in this Pangborn machine. Scale is shot blasted from stock which is rotated as it moves through machine.

When you walk into the new mill building at Rotary Electric Steel's 47-acre Detroit plant, you find yourself in one of the most modern stainless processing mills in the industry.

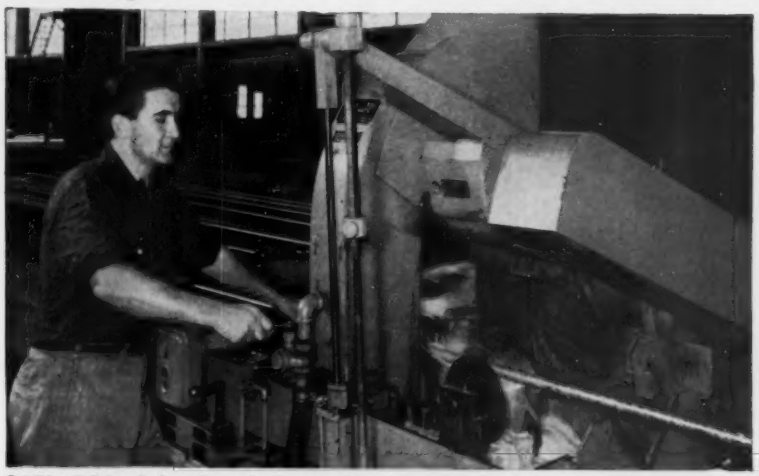
This new facility is the result of a decision made two years ago to market more of the company's stainless output in finished items. The stainless specialty bar business was chosen, as Rotary has one of the most flexible bar mills in the industry, but no finishing equipment for flat rolled products.

New Facilities — Production-wise, the decision posed no problems. Rotary's six electric furnaces with rated capacities up to 60 tons were already turning out stainless, carbon, and alloy steels. The versatile blooming mill rolls sections from 6" square to 19" square, and slabs from

(Advertisement)



AFTER straightening on one of several machines, bars go either to high-speed turning machine or to one of sixteen centerless grinders for surface finish or sizing.



OPERATOR of this Campbell wet-abrasive cutoff machine cuts finished bars into warehouse lengths. Several such machines are employed.

NEW storage facilities insure the prompt servicing of inquiries and orders for quality stainless bars. Note the extreme size variation.

44" wide down to a thickness of 2⅛". This mill is equipped for fast roll changes, as are the five-stand billet mill and the semi-continuous bar mill.

While the bar mill at Rotary is flexible, and rolls rounds from ½" to 4⅜" and hexes from ½" to 2" in diameter, a new combination hand and mechanical mill is now being installed that will cover a wider product range and have considerably greater flexibility. For the new program, completely new stainless annealing facilities were needed. The Drever roller-hearth furnace was chosen for its ability to handle a wide range of bars from ½" to 4⅜", and coils of wire.

A new batch-type roller hearth annealing furnace, which is 153 feet long, accommodates bars up to 36 feet long or several skids of coiled wire. Cold bars are arranged on the 40-inch wide entry table while the preceding batch is in the furnace. When heating is complete, operator moves the hot batch out and cold batch in at 105 fpm. Output is about 3 tons per hour of 300-series alloys.

Finishing Department—After annealing and quenching, stainless bars move into the new finishing department where bars, shapes, and wire are converted into warehouse items.

Bars may first get a shot blasting in the new Pangborn 2-wheel machine, following which they are pickled, cold-drawn, centerless ground on one of sixteen Cincinnati machines, and cut to length on a Campbell wet-abrasive cutoff machine. Or, they may be straightened, turned on a high speed Medart machine, and then centerless ground.

Finished bars are approved to meet definite specifications before shipping to either customers or to warehouse racks.

A stock of hundreds of tons of finished stainless steel bars is available for immediate shipment. New storage facilities insure the prompt servicing of inquiries and orders.

New Color Brochure—"How Steel Is Made At Rotary" is a 4-color booklet that shows the plant and facilities of the company. Copies can be obtained by writing Rotary Electric Steel Co., Box 4606, Detroit 34, Michigan. Rotary has sales offices and agents in Detroit, Indianapolis, Newark, N. J., Cleveland, and Chicago.

(Advertisement)

PLANE ANSWERS pilot's every direction—thanks to strong, flexible control cables made of CF&I-Wickwire Aircraft Cord Wire. This wire undergoes extremely rigid testing to meet highly exacting specifications.

FOR A CLEAN SWEEP. Power street-sweeping machines use bristles of tough CF&I-Wickwire Flat Tempered Brush Wire.

BEAUTY TIPS. Tons of wire are used by beauty shops in the form of bobby pins, hairpins and curlers. CF&I-Wickwire Hairpin Wire is used for these and many other mass-produced cosmetic items.

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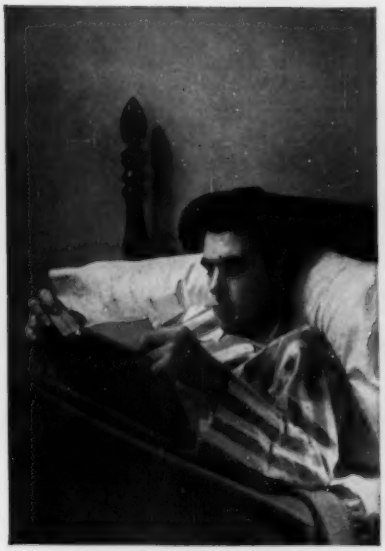

"SPRING TIME" COMFORT. Coil bedsprings, mattress inner springs and mattress edge reinforcing are all made of CF&I-Wickwire Spring Wire in several tempers and hardnesses.

ROLLING ON WIRE. Strong, rigid spokes for automobile wheels are made of CF&I-Wickwire Spoke Wire.

MAKING BOOK. This eager young student's notebooks and textbooks are bound with CF&I-Wickwire Bookbinder Wire and Spiral Binding Wire.

from holding a plane on its course, to keeping a curl in place... wire is the practical answer!

Wire can answer an almost incredible variety of needs because it can be varied to provide thousands of different combinations of mechanical and physical properties. From wire that can be easily twisted by hand to a rigid, self-supporting wire, it can be "tailor-made" to meet almost any set of requirements. Whatever you assemble, manufacture, or process, look into the many advantages of using CF&I-Wickwire Wire. You'll like doing business with CF&I-WICKWIRE and the careful attention given your own particular requirements.

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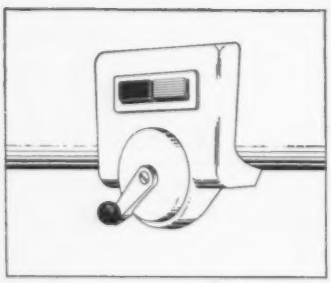
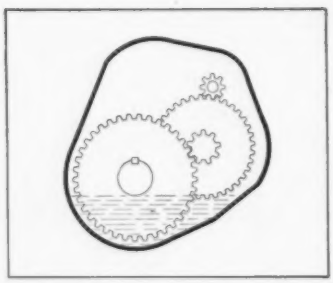
2 New CINCINNATI PRESS BRAKES

THIRTY TON - - - - 2-30 SERIES
FIFTY TON - - - - 3-50 SERIES

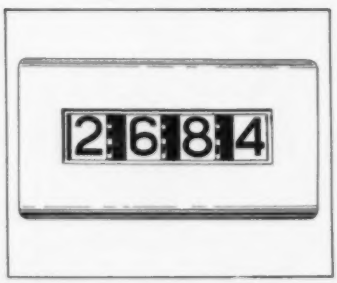
COMPETITIVELY PRICED



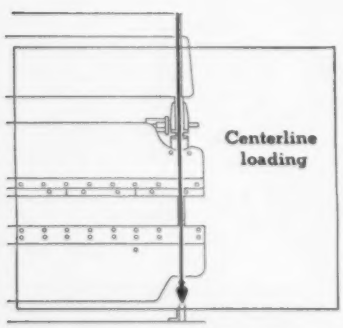
Front controlled, variable speed drive, 20 to 50 strokes per minute.



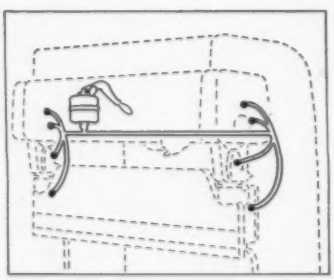
Completely enclosed transmission, running in oil.



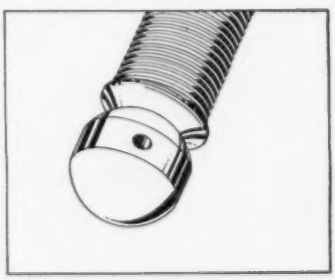
Two micrometer indicators, one at each end of the ram—easy to read and accurately record the amount of adjustment and tilt.



Centerline loading prevents weaving of the housings and insures accurate bends.



Centralized pressure lubrication system.



Ball end on the ram adjusting screws permits tapering of the ram for fade-out work.

CINCINNATI

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

2-30 SERIES

This new 2-30 Series Cincinnati All Steel Press Brake has a capacity of 14 gauge x 6′ mild steel.

Look at these unusual standard features:

2½″ stroke—12″ shut height—9″ throat.

Distance between housings 5′-2″—overall die surface, 6′-0″.

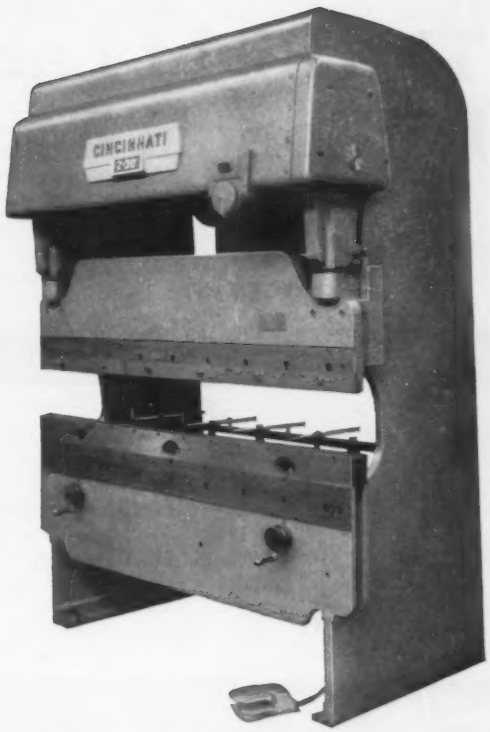
Front controlled, variable speed drive, 20 to 50 SPM. 4″ manual ram adjustment including ram tapering adjustment for fade-out work (power adjustment available as extra feature).

Bronze swivel end-guide bearing for accurate endwise alignment, even when tilting ram.

Brushless electro-magnetic brake and clutch.

Deep bed and ram, planed and drilled for 5¾″ angles.

Micrometer indicators on both ends of ram for fast, accurate setting.



3-50 SERIES

These new 3-50 Series Cincinnati All Steel Press Brakes are built in two lengths and have a capacity of 10 gauge x 6′ mild steel. Investigate these unusual standard features: 3″ stroke—12″ shut height—12″ throat—distance between housings 6′-6″ or 10′-6″—overall die surface 8′-0″ or 12′-0″—front controlled, variable speed drive, 20 to 50 SPM.

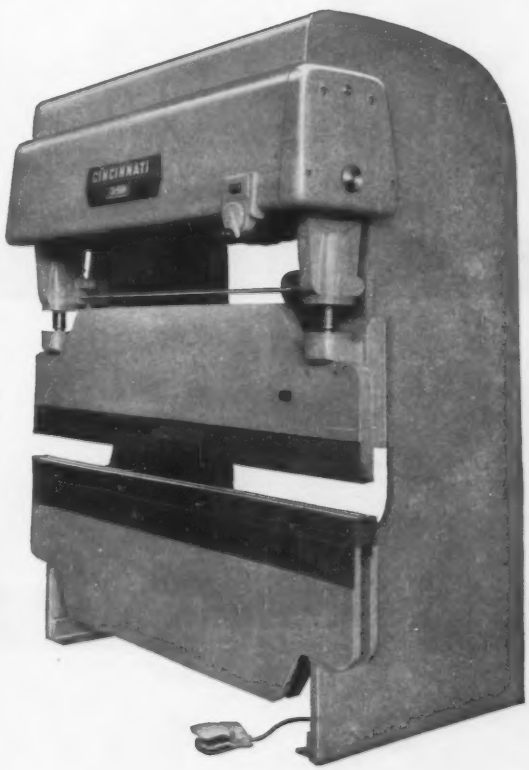
5″ motorized ram adjustment, including ram motor and control, complete with ram tapering adjustment for fade-out work.

Bronze swivel end-guide bearing for accurate endwise alignment, even when tilting ram.

Brushless electro-magnetic brake and clutch.

Deep bed and ram, planed and drilled for 5¾″ angles.

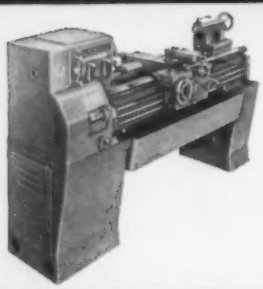
Micrometer indicators on both ends of ram for fast, accurate setting.



The Right Lathe for You from LeBlond's Complete Line...

Regal Lathes

Dependable Performance at Low Cost



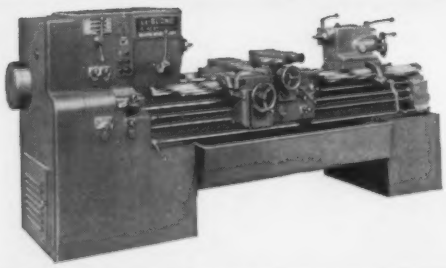
13", 15", 17", 19", 21", 24"; 2 to 5 horsepower

Designed and built like heavy-duty lathes, the new LeBlond Regals will give you a long life of precision production, minimum maintenance and the kind of dependability you'd expect from a much higher-priced machine!

Major features: Hardened and ground replaceable steel bed ways. Combination gear-belt drive headstock. *Both* feed rod and leadscrew. 3-bearing spindle. Advanced styling. Plus general construction details patterned after LeBlond heavy-duty lathes.

Small Heavy Duty Lathes

Stamina Plus with Precision



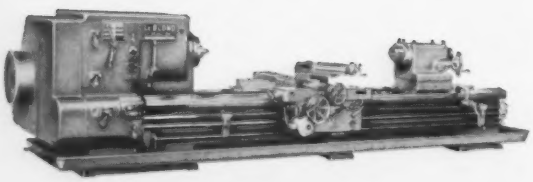
12", 14", 16", 20"; 7½ to 20 horsepower

LeBlond heavy-duty engine lathes have always been known for their outstanding stamina—the ability to stand up to the toughest turning jobs with precision, year after year. Our new machines in this class are the most rugged, yet precise that we've ever built!

Major features, 16" machine shown: Single-lever, four-way power rapid traverse built into the one-piece apron. Combination gear-belt drive headstock with 27 speeds from 16 to 2000 rpm. Totally-enclosed quick-change box. Hardened and ground replaceable steel bed ways. Automatic lubrication.

Large Heavy Duty Lathes

Heavy Hogging or Fine Finishing with Ease



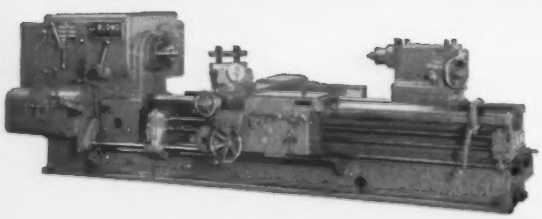
25", 32", 40", 50"; 50 and 60 horsepower

When large-swing work is in your production picture, check these big LeBlonds. Whether you need real high power, contoured shapes or fine finish, LeBlond offers the utmost in dependability, speed and easy operation.

Major features, 32" machine shown: Adjustable acceleration for starting, stopping, jogging provides true safety. 36-speed headstock, spur gear design for the lowest no-load friction horsepower. Four-way power rapid traverse (six-way on 40s or 50s). Generous proportions throughout for long-lived stamina and precision!

Sliding Bed Gap Lathes

Maximum Versatility with Dependability



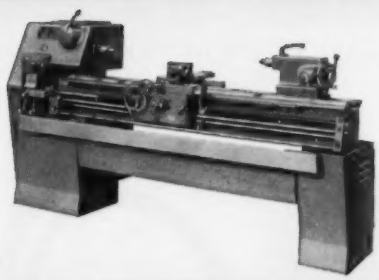
16"/38", 25"/50", 32"/60" Heavy Duties; 17"/28" Regal

Lathe department all rolled up in one machine! In addition to regular turning, facing, chasing, tracing, you can handle odd-shaped or large-diameter work as well as extra-long pieces.

Major features, 25"/50" machine shown: Sliding upper bed moves easily to provide variable gap or capacity for extra length. 36-speed high-power headstock. Special one-piece apron with extended length handwheel brings cutting tool close to gap. Four-way power rapid traverse.

Dual Drive Lathes

Best Buy for Medium-duty Turning



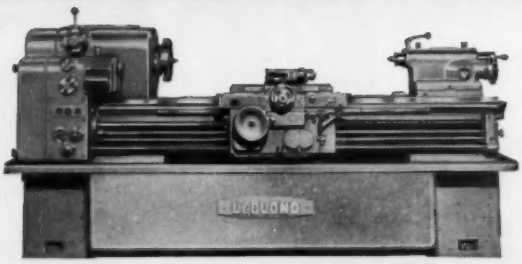
15″; 5 horsepower

Dual Drive gives you efficient capacity for the great proportion of your lathe work. Smooth and powerful spindle speeds satisfy all requirements up to those requiring a heavy-duty machine. Precision production at moderate cost!

Major features: Single-lever choice of 16 spindle speeds from 31 to 2400 rpm through combination gear-belt drive headstock. Hardened and ground replaceable steel bed ways. Totally-enclosed quick-change box. Automatic lubrication. Double-wall, one-piece apron.

Model RT Toolroom Lathes

The Ultimate in Precision, Convenience, Versatility



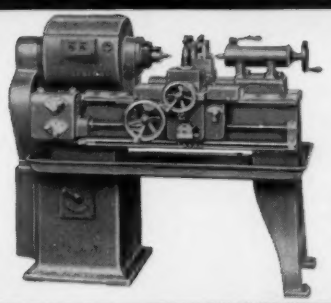
16″; 7½ horsepower

Even today, other lathes can't match the advanced designs pioneered by LeBlond in the RT Toolroom Lathe. When it comes to producing a wide variety of fine toolroom work, no other lathe can match the convenience, precision and speed of the RT.

Major features: Infinitely-variable spindle speeds from 6 to 1500 rpm by a single lever. Universal quick-change box provides 90 feeds and threads. Four-way power rapid traverse. Combined feed apron cuts steep tapers. Automatic chasing stop limits cross slide travel, saves time in chasing threads.

Rapid Production Lathes

Best for Low-cost High Production



13″, 17″, 21″; 3 to 10 horsepower

Not a stripped down engine lathe, RP is designed to give you high production for a variety of work within a range you choose. A great number of productive attachments are available to suit your special needs.

Major features, 13″ machine shown: Choose from three headstocks that give you speeds as low as 68 rpm and as high as 3600 rpm. Hardened and ground replaceable steel bed ways. Automatic lubrication to headstock and feed box. Heavy-duty carriage and apron.

LeBLOND also Builds:

Plain Bed Gap Lathes.....12″, 14″, 16″, 20″, 25″, 32″

Hollow Spindle Lathes.....16″, 20″, 27″, 30″

Toolroom Lathes.....12″, 14″, 16″, 20″

Standard Duty Lathes.....20″, 25″, 32″, 40″

Crankshaft Lathes.....Automatic—for any crank

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Hydra-Trace*
Duplicating Attachment...Fits most LeBlonds built since 1935
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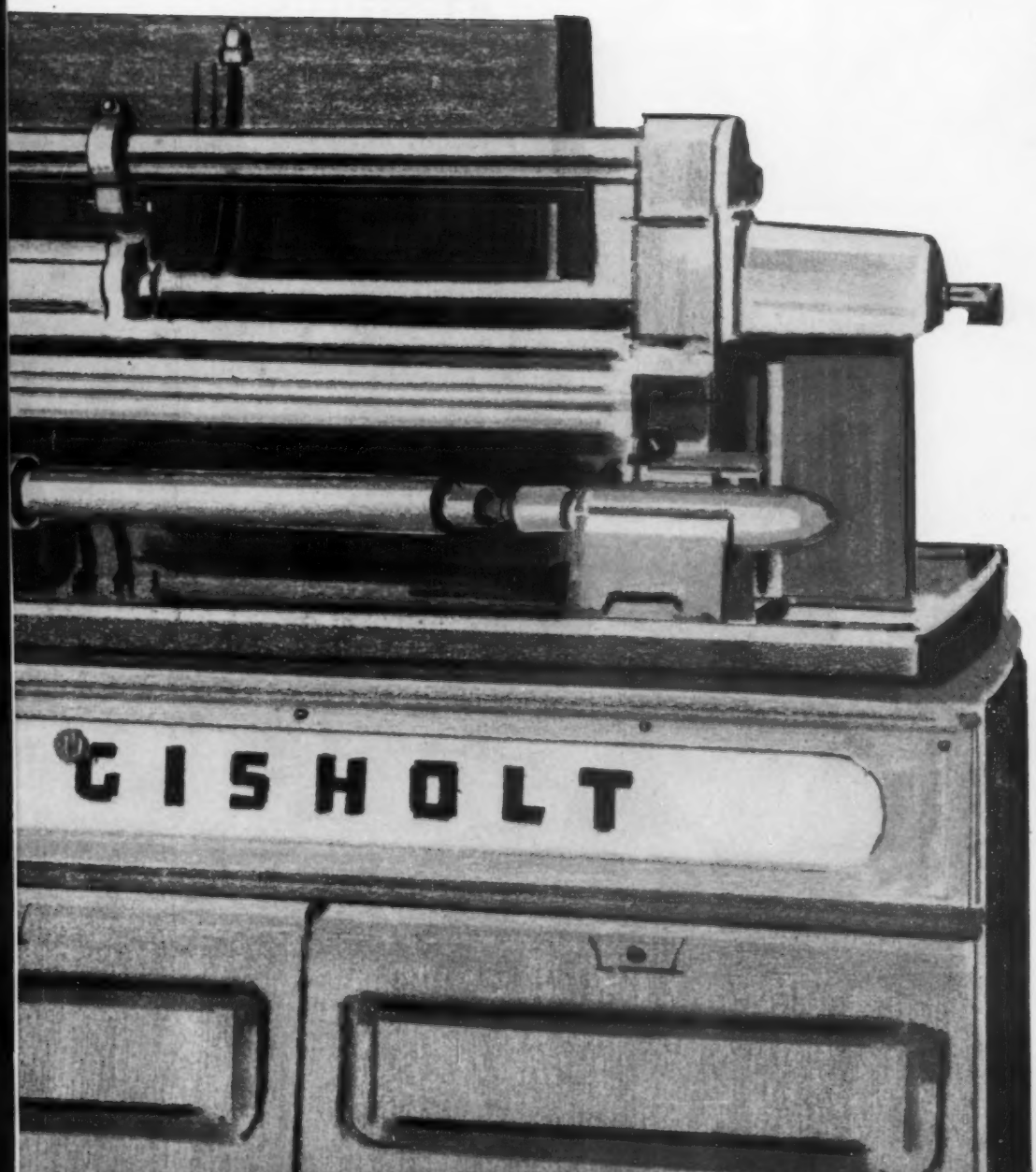
Look ahead—keep ahead—with Gisholt



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Only 24" high, 12½" wide, 19½" deep.
EASY TO SET UP
Ram pressures to one-ton with peak operator safety.
8" OF DAYLIGHT WITH 3" STROKE
for easy setup of dies and fixtures.

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New! 1-TON DENISON Hydraulic Multipress® featuring pressure reversal

Industry's most versatile production tool that:

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PRODUCES HIGHER QUALITY WORK because ram pressure and time dwell are precisely duplicated *on every stroke.*

IS COMPLETELY SAFE TO OPERATE . . . safeguards against accidental tripping.

And gives you these plus benefits:

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Faster setup with plenty of daylight. Easier adjustment of ram pressure.

Longer die life because Multipress eliminates damage to tools through improper loading of parts.

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Type of Operation	Type of Material
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☐ Marking	☐ Brass
☐ Punching	☐ Aluminum
☐ Trimming	☐ Plastic
☐ Broaching	☐ Glass

☐ Have Salesman Call

Company Name _____

Address _____

City _____ *Zone* ____ *State* _____

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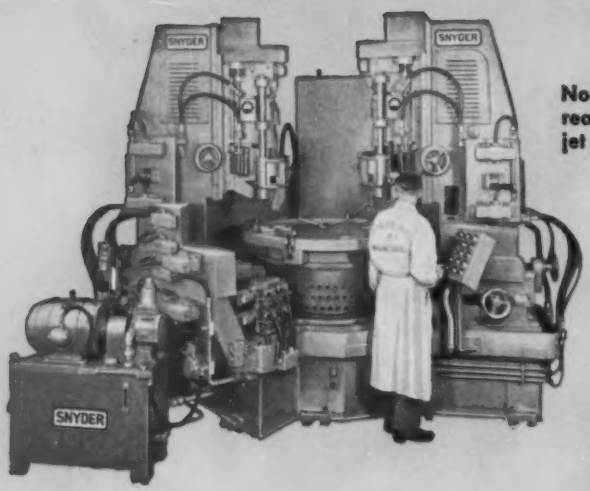
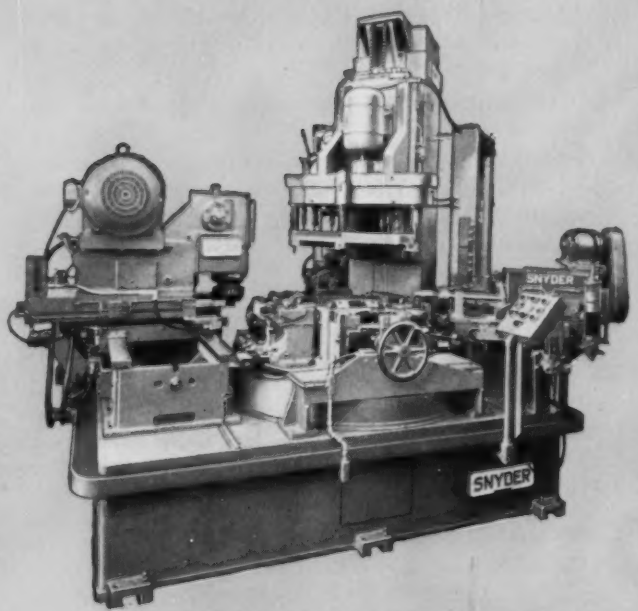
Position _____



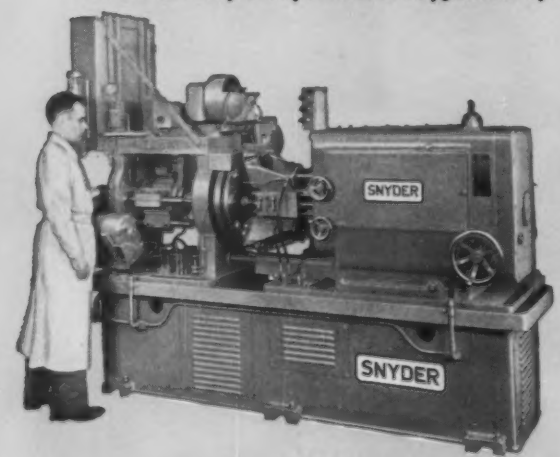
No. 70165—Special index machine to drill and ream holes in rims of outer shroud spacers for jet engines. Production 2 parts per hour.

No. 65412—Special automatic machine, for weighing and precision balancing a variety of heavy-duty and diesel engine connecting rods from 7⅜" to 12" center distance. Weighs rods and automatically balance mills to plus or minus 2 grams.

No. 207390—Special, double-end precision boring machine for finish boring, counterboring and chamfering counter shaft, intermediate and shifter shaft holes on power take-off cases. Production 82 pieces per hour at 80% efficiency.



No. 73902—Special 4-station automatic index machine for milling joint face, drilling and reaming vertical and horizontal holes in exhaust manifolds. Production 80 pieces per hour at 80% efficiency.



No. 68526—Special double end trunnion machine, fully automatic, for machining special aircraft rivets. Machine is automatically loaded and unloaded. Production rate varies with size of rivet.

SNYDER VERSATILITY

in engineering and building metal-cutting machines includes not only the great Snyder line transfer machines with automation, but also many smaller and diversified machines in which the standards of performance and economy are no less exacting. A few representative examples are shown.

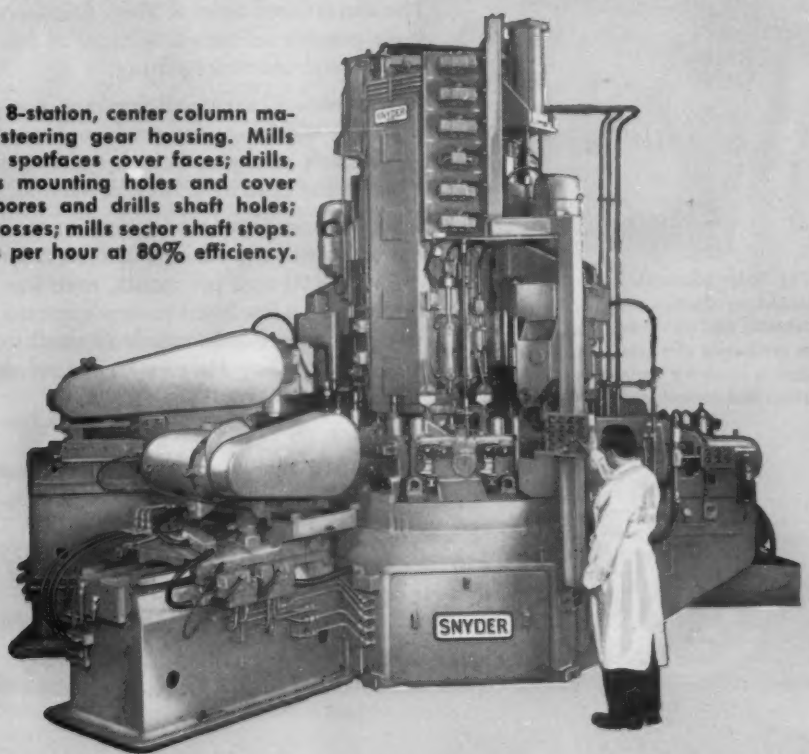
SNYDER

TOOL & ENGINEERING COMPANY

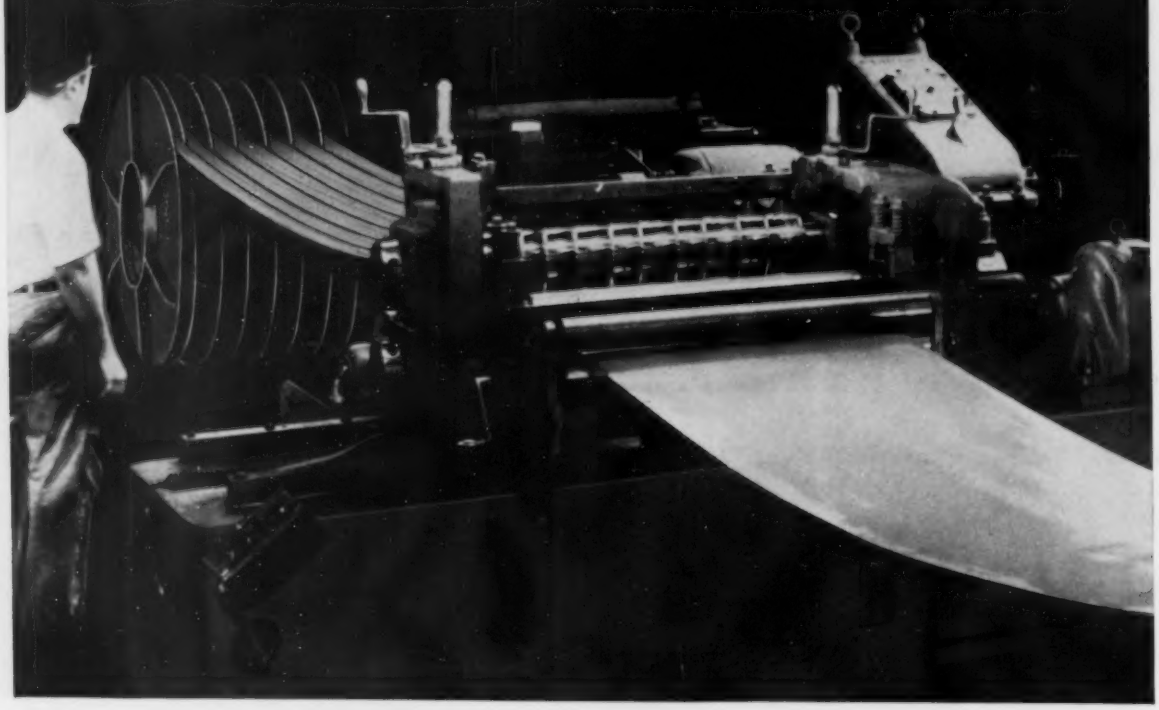
3400 E. LAFAYETTE • DETROIT 7, MICHIGAN

31 Years of Special Machine Tools with Automation

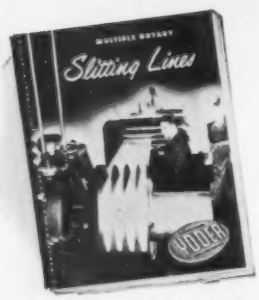
No. 72976½—Special 8-station, center column machine for processing steering gear housing. Mills pads and cover faces; spotfaces cover faces; drills, countersinks and taps mounting holes and cover holes; rough counterbores and drills shaft holes; mills two Welch plug bosses; mills sector shaft stops. Production 260 pieces per hour at 80% efficiency.



AN EFFICIENT SLITTING LINE



...with big savings possibilities



The Yoder Slitter Book contains time studies, production records, and other valuable data on the economics as well as mechanics of slitter operation. A copy is yours for the asking; also estimates and recommendations.

The standardized series of Yoder Uncoilers, Slitters and Recoilers make possible an infinite number of combinations for highly efficient coil and sheet slitting.

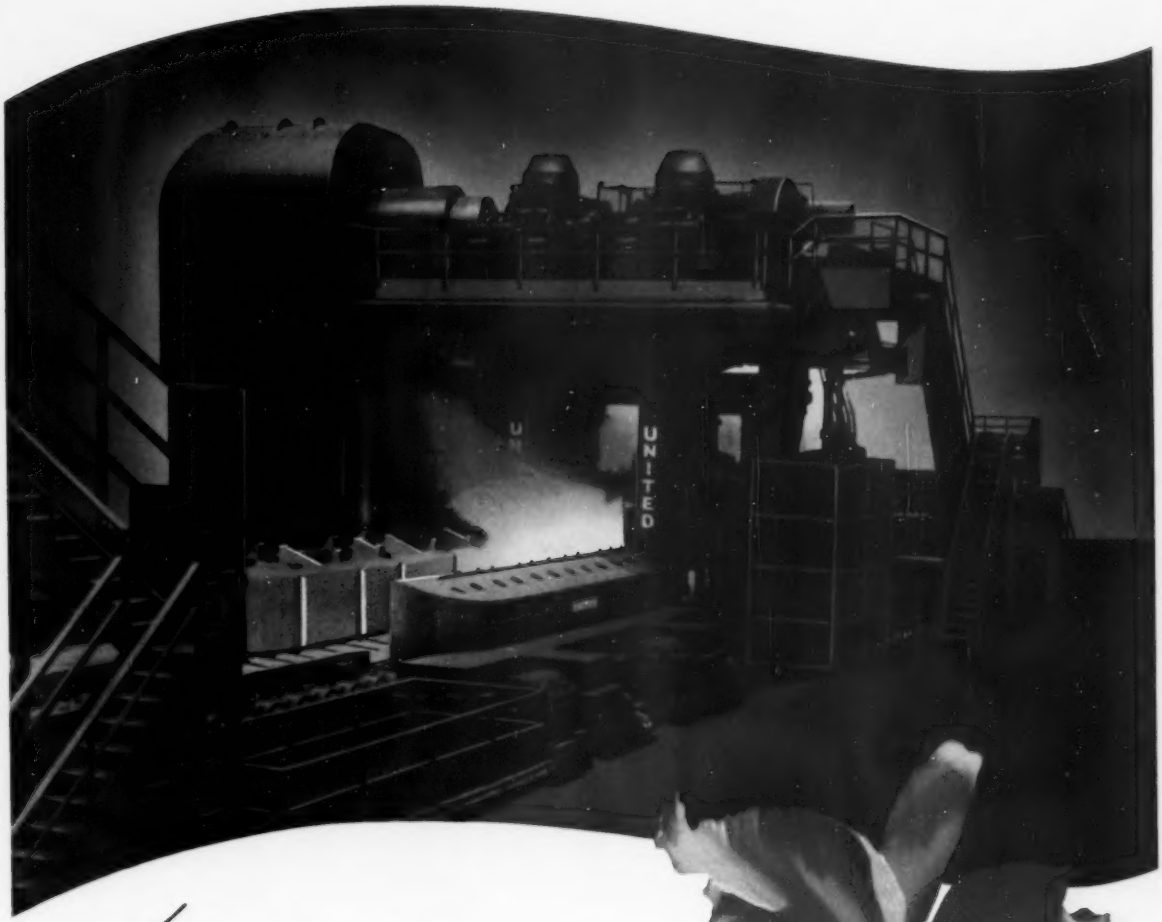
At a substantial saving in first cost, one of these combinations will meet widely varying production needs of fabricating shops as efficiently as higher priced, built-to-order equipment (also designed and built by Yoder) for very big tonnage requirements.

A Yoder standardized slitting line is a most profitable production tool which will pay for itself in short order on strip requirements as low as 100 tons per month, even less. Equally important is the ability in a few hours to meet expected and unexpected needs for slit strands, from a relatively small stock of standard width coils. This greatly reduces strip inventories and simplifies production planning.

THE YODER COMPANY • 5510 Walworth Avenue, Cleveland 2, Ohio

ENGINEERING YODER MANUFACTURING

ROTARY SLITTING LINES
COLD ROLL FORMING MACHINES
ELECTRIC-WELD PIPE AND TUBE MILLS



An Orchid to a Champion

45" Reversing Slabbing Mill which has broken all world records by rolling 214,842 net slab tons in one month.

designed and built by

United

ENGINEERING AND FOUNDRY COMPANY

Pittsburgh, Pennsylvania

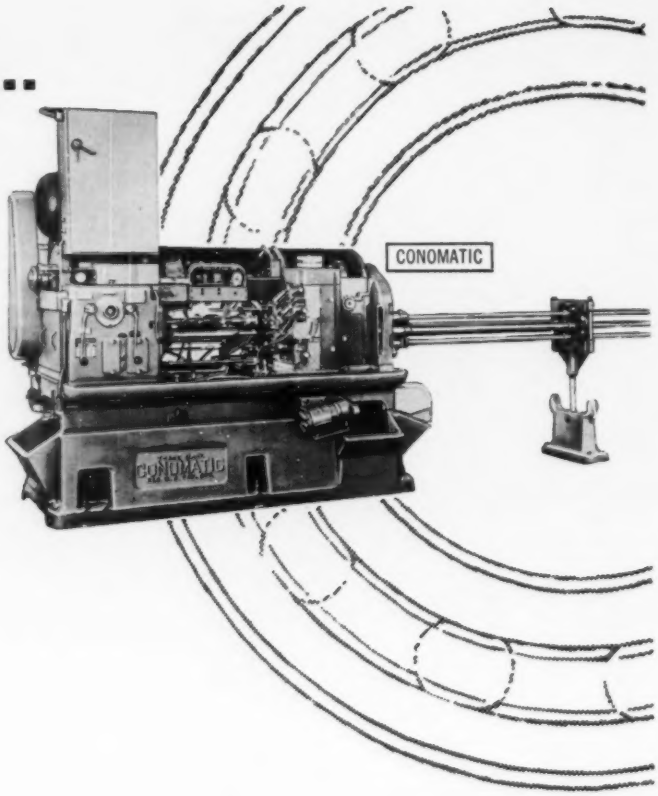
PLANTS AT PITTSBURGH • VANDERGRIFT • YOUNGSTOWN
CANTON • WILMINGTON (LOBDELL UNITED DIVISION)

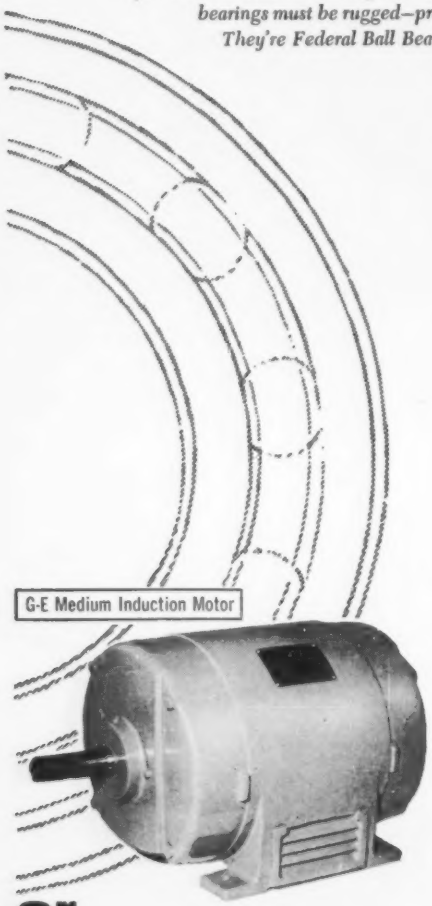
SUBSIDIARIES: ADAMSON UNITED COMPANY, AKRON, OHIO
STEDMAN FOUNDRY AND MACHINE CO., INC., AURORA, INDIANA

Designers and Builders of Ferrous and Non-Ferrous Rolling Mills, Mill Rolls, Auxiliary Mill and Processing Equipment, Presses and other heavy machinery. Manufacturers of Iron, Nodular Iron and Steel Castings and Weldments.

to feed a tool...

Automatic feed transmissions on newest type Conomatic Six Spindle Bar Machines have to deliver a powerful, steady tool drive under heavy loads for precision carbide machining. Feed shaft bearings must be rugged—precise. They're Federal Ball Bearings.





or quiet a motor...

The smooth hum of today's precision-built motors whispers the efficiency of every part. Here, too, Federal Ball Bearings quietly perform their continuous, anti-friction assignment—whatever the size—whatever the type.

so much of industry *turns* on FEDERAL ball bearings

Machine tools—motors—or moving vans! At plant, home, machine shop! On the highway, on the farm—where there's anti-friction work to be done, you'll find Federal Ball Bearings quietly and efficiently on the job. Hundreds of types—12,000 sizes—produced by this 50-year-old manufacturer of ball bearings...exclusively.
When Federal Ball Bearings are a part of so many things you *use*, shouldn't they be a part of the things you *make*?

Just off the presses! *175 pages of ball bearing and engineering data*—FEDERAL'S NEW CATALOG! *Just drop us a line and we'll speed you your copy.*

THE FEDERAL BEARINGS CO., INC. • POUGHKEEPSIE, N. Y.

Federal BALL BEARINGS

One of America's Largest Ball Bearing Manufacturers

SUPERIOR stainless strip steels
precise in composition
uniform in handling ease
versatile in application
You can depend upon the fine behavior of Superior Stainless Strip Steels—every step of the way from initial uncoiling in your plant to long and satisfactory product service in the hands of your customers. • We build precise uniformity into every Superior grade: each grade has its specific and profitable field of applications. Let us cooperate on your needs!
Superior Steel
CORPORATION
CARNEGIE, PENNSYLVANIA

HARDINGE
ELMIRA, N.Y.

Variable Speed Machine
for
PRODUCTION DEPARTMENTS

Produce More Precision Parts at Lower Cost with this NEW Second Operation Machine

Send for Free illustrated Bulletin DSM59

HARDINGE BROTHERS, INC., ELMIRA, N. Y. U.S.A.

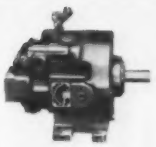
See ***HARDINGE MACHINES IN ACTION*** *– SPACE 452 – CHICAGO – A.S.T.E. SHOW*

What's New in VICKERS HYDRAULICS

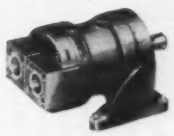
Illustrated here are new and recently improved units added to Vickers most complete line of oil hydraulic equipment. Look to Vickers as a single responsible source for integrated hydraulic systems. For characteristics of any of these components, please write for Installation Drawings by number.

SERIES T8 PIPELESS POWER PACKAGE consists basically of electric motor, hydraulic pump, control circuit and reservoir. Available in 3 circuits, 3 pump sizes and 3 electric motor sizes. Inst. Dwgs. 178706, 7 & 8.

V-LINE PISTON PUMPS AND MOTORS for 5000 psi. Unique design minimizes relative movement between rotating parts, provides increased bearing surfaces and reduces complexity of parts. Result is improved efficiency, longer life, and reduced maintenance. Supplied with straight thread connections. Bulletin 55-72.

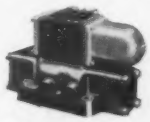


Variable Displacement Pump With Servo Control. Inst. Dwg. 179061. Also available with pressure compensator control. Inst. Dwg. 179060.



Constant Displacement Fluid Motor. Inst. Dwg. 179059. Available also is a Constant Displacement Piston Pump. Inst. Dwg. 179058.

DG4S4 ⅛" solenoid operated. Inst. Dwg. 182412. ¼" available later.



DG5S4 ¾" solenoid controlled pilot operated. Inst. Dwg. 182413. 1¼", 2", 3" available later.

SOLENOID OPERATED 2- AND 4-WAY VALVES with many improved features. (1) Integral junction box (2) covers that retain the solenoids and (3) manual operation for testing. Compact and versatile. Gasket mounting simplifies installation and overhaul . . . also minimizes piping.

TRAVERSE AND FEED CYCLE CONTROL PANEL Improved design. Provides any cycle sequence of rapid advance, adjustable feed, dwell and rapid return motions. Maintains smooth and constant preset feed rate (either one or two) regardless of fluctuations in cutting tool resistance or hydraulic pressure.

SEE VICKERS EXHIBIT at the TOOL SHOW BOOTH 1411

CPP-2242 Solenoid Controlled. Pilot Operated (gasket mounted) provides smooth, low current operation. Inst. Dwg. 182414.

CG-03 Relief Valve (gasket mounted). Subplates available with pipe or straight thread connections. Inst. Dwg. 175630. CS-03 available with straight thread connections. Inst. Dwg. 175629.

C02 Reciprocating Cycle Control Panel For Gasket Mounting. Inst. Dwg. 177083.

4CG-03 Pilot Operated Check Valve, gasket mounted. Inst. Dwg. 135468.

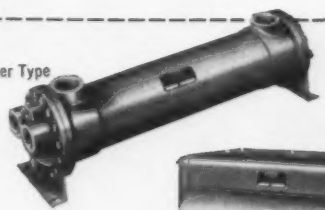
CG-714 Deceleration Valve, gasket mounted. Inst. Dwg. 172902.

CGV-06 5000 psi Relief Valve gasket mounted with straight thread connections. Inst. Dwg. 177609.

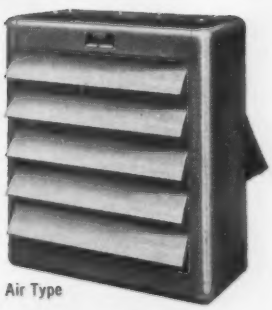
URG1 Unloading Relief Valve, gasket mounted. Inst. Dwg. 178974.

SG1 Pressure Switch, gasket mounted. Inst. Dwg. 172538.

Water Type



OIL COOLERS Vickers Oil Coolers are characterized by their very high rate of heat transfer per unit of space occupied. Bulletin 55-69.



Air Type

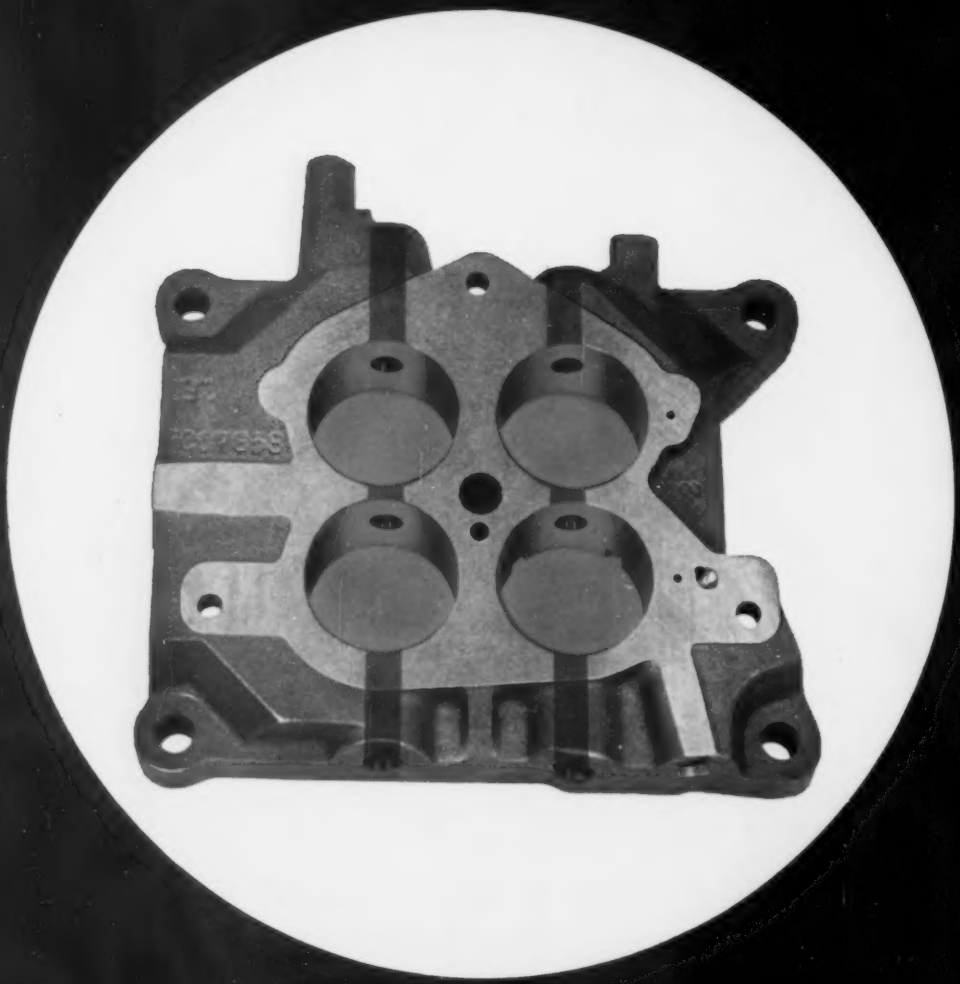
For further information on any unit shown, ask for Installation Drawing by number indicated. 7435

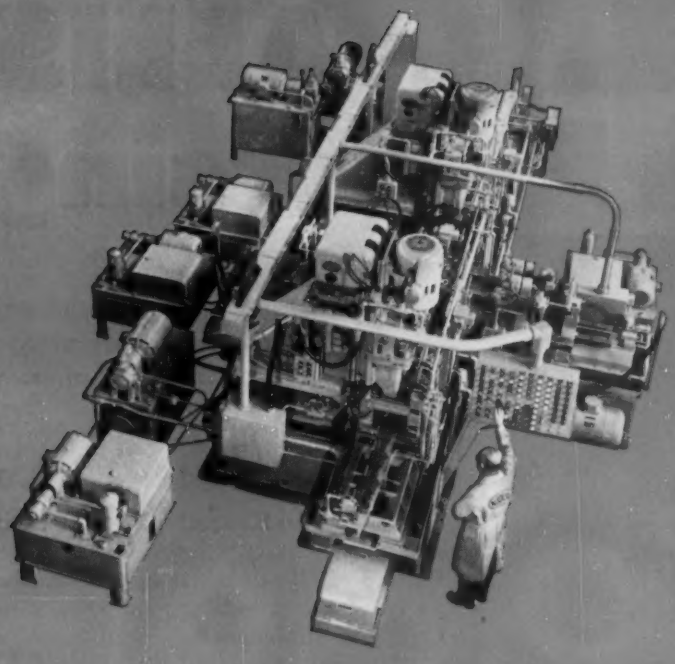
VICKERS INCORPORATED
DIVISION OF SPERRY RAND CORPORATION
1420 OAKMAN BLVD. • DETROIT 32, MICH.

Application Engineering Offices: • ATLANTA • CHICAGO CINCINNATI • CLEVELAND • DETROIT • HOUSTON • LOS ANGELES AREA • (El Segundo) • MINNEAPOLIS • NEW YORK AREA (Summit, N.J.) PHILADELPHIA AREA (Media) • PITTSBURGH AREA (Mt. Lebanon) PORTLAND, ORE. • ROCHESTER • ROCKFORD • SAN FRANCISCO AREA (Berkeley) • SEATTLE • ST. LOUIS • TULSA • WASHINGTON • WORCESTER
IN CANADA: Vickers-Sperry of Canada, Ltd., Toronto

ENGINEERS AND BUILDERS OF OIL HYDRAULIC EQUIPMENT SINCE 1921

Here's Automatic Production On High-precision Parts





When is fast transfer production limited by precision requirements? This frontier is steadily being pushed back by Natco engineers in new Holeway processing machines.

Take this throttle body, for example. The large holes are reamed to *limits of .0015" for location, .0003" for size, 125 microinch* finish! Production—*600 parts per hour!*

Natco's high-speed gun-drilling heads give required finish in interrupted throttle-shaft holes without reaming. Size is held to within .001".

Many unusual problems are solved in locating, holding and positively controlling light-weight parts between stations at high transfer speed. Chip disposal is automatic; cutting oil is filtered for re-use.

Here's the sequence of operations. Combination rough and semi-finish ream four large holes. Gun drill two holes (two breakthroughs each). Finish ream four large holes.

Whenever fast, automatic production makes sense, don't let high-precision requirements stop you. A Natco engineer can tell you in a hurry whether it's feasible and how the job can be done.

National Automatic Tool Company, Inc.

Richmond, Indiana

Multiple-spindle drilling, boring, facing and tapping machines
Special machines for automatic production

NATCO

Notes from Natco...

Beating the Index Hex

Common design dilemma . . . heavy rotating tables and high-speed indexing just don't want to mix. Priding ourselves on being good mixers, we added a hydraulic decelerating device, giving us tables that index faster than ever and still stop on a gnat's eyelash.

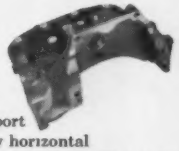
Automatic Squirt

Universal joints universally demand frequent lubrication. Our adjustable joint-drive heads now include automatic lubrication. Once the timer's set, the oil will jet . . . at any time interval you select. One more thing the operator can forget about.

One Will Get You Four

Here's an investment return that makes Florida real estate look like shaky speculation. Sixteen months ago one of our customers bought a new Natco light sensitive multi-driller and tapper. Cost . . . under $5,000. To date they report direct labor savings of $20,000.

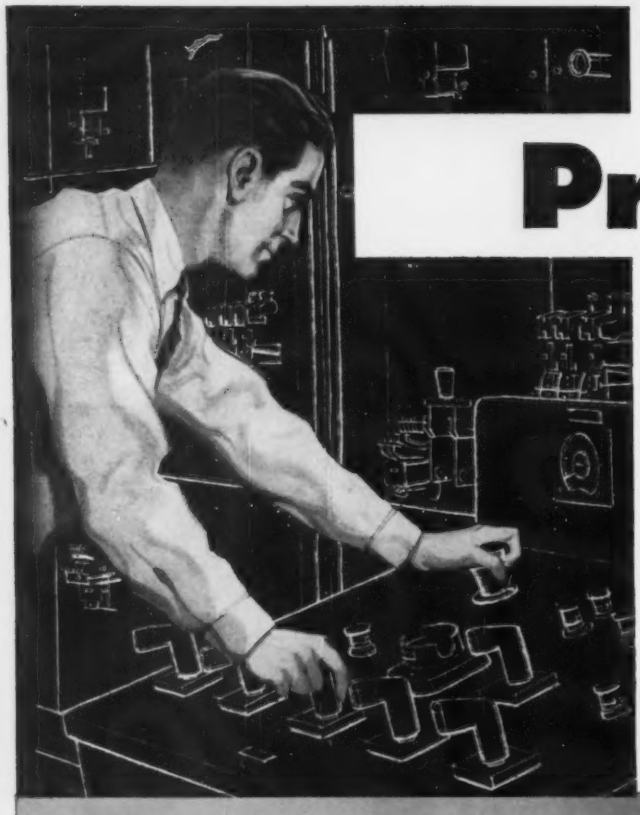
Processed by Natco Machines



Part: Front Axle Support
Machine: Natco 3-way horizontal
Operations: Drill 7 holes; Core drill 1 hole; Combination drill and chamfer 4 holes; Combination drill and spotface 1 hole; Tap 11 holes
Production: 16 per hour

Part: Crankshaft
Machine: Natco trunnion type
Operations: Drill, face and tap 1 hole; Drill, chamfer and ream 6 holes; Drill, semi-finish and finish ream 1 hole; Drill and ream 1 hole; Tap 6 holes
Production: 42 per hour

Part: Steering knuckle
Machine: Natco trunnion type
Operations: Spotdrill 4 holes; Drill 5 holes; Spotface 5 holes; Ream 2 holes; Combination ream and counterbore 1 hole
Production: 250 per hour



ALLIS-Processing

Allis-Chalmers constant potential and variable voltage systems are providing dependable precision control in many of the nation's largest mills.

When you modernize

to meet the double challenge of a growing market and heavy competition, take advantage of Allis-Chalmers experience. See your nearby representative or write Allis-Chalmers, Milwaukee 1, Wisconsin.

A-4659

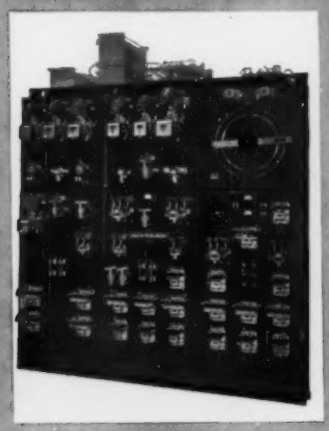
Magnetic amplifier speed regulatory panels.

Variable voltage control board for 39-inch continuous annealing line.

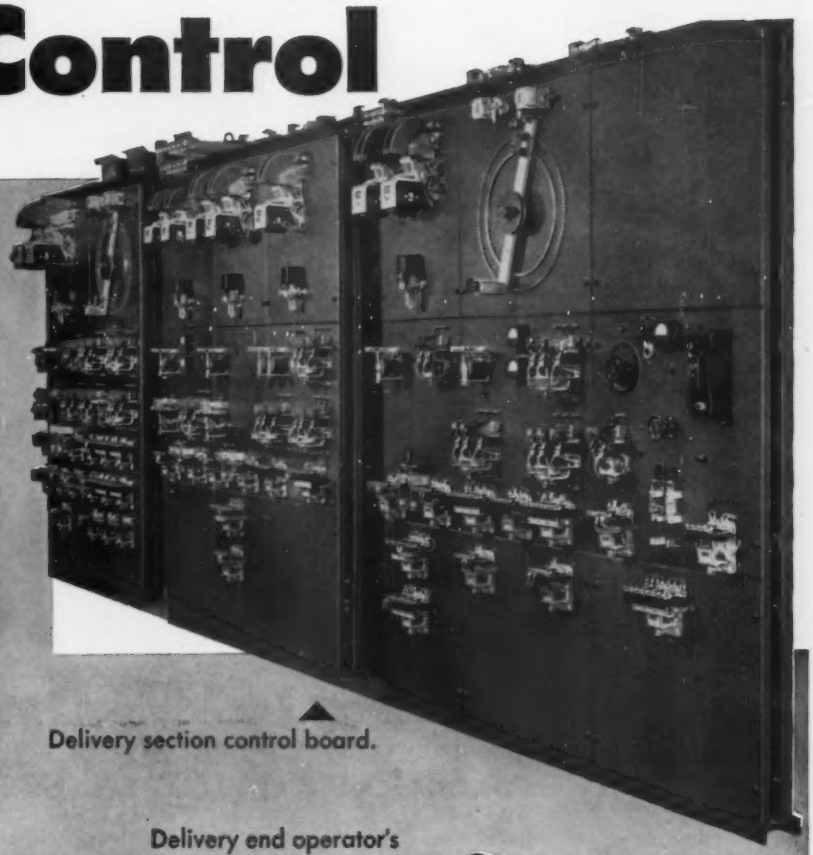
A-C ALLIS-CHALMERS

ALLIS-

CHALMERS
Line Control



Entry section control board for pickle line.

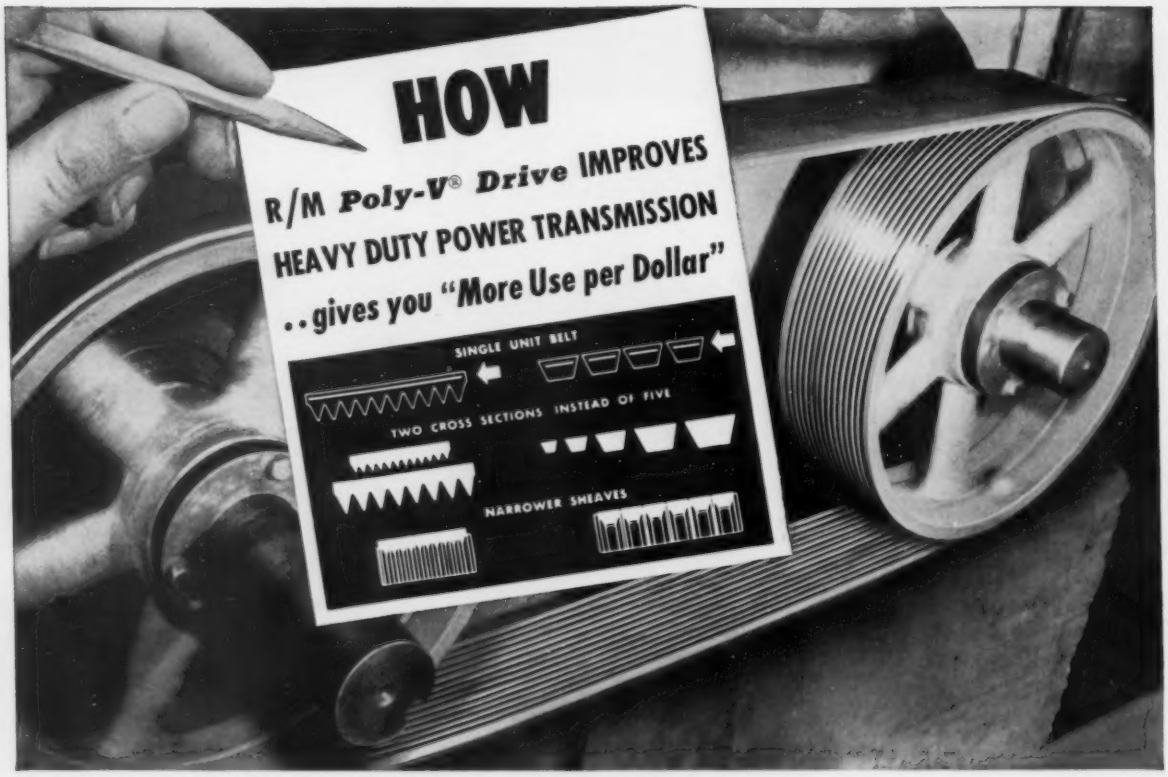


Delivery section control board.

Delivery end operator's desk, stainless steel top.

Riveter's cabinet, stainless steel front.

CHALMERS



R/M *Poly-V®* Drive

Delivers More Power in Less Space!

No other belt drive can deliver as much power in the same space. It's R/M's patented Poly-V Drive developed by R/M engineers after years of research. This totally new concept in power transmission delivers up to 50% more power than a conventional V-belt drive of equal width.

Unique design accounts for the unusual power capacity of R/M Poly-V Drive. A *single, endless* belt with parallel V-ribs runs on sheaves specially designed to mate precisely with the belt ribs. The uniform pull of this single unit belt distributes drive load evenly over the full width of the sheave . . . gives higher horsepower capacity per inch of drive width than ever before possible.

There are many advantages in this space-saving drive wherever heavy duty power transmission is required . . . in the equipment you manufacture—or the equipment you use in your plant. Poly-V Drive has eliminated the matching problems of multiple V-belt drives, greatly increased the life expectancy of belts and sheaves and maintains more constant speed ratios under all loads. Just *two* cross sections of Poly-V meet every heavy duty power requirement—R/M Poly-V Drive cuts costly belt and sheave inventories to a new low!

Let the R/M engineers who developed Poly-V Drive work with your engineers to improve your power transmission applications. Contact R/M . . . or write for a copy of Poly-V* Drive Bulletin #6638.

CONDOR V-BELTS • R/M SUPER-POWER V-BELTS

Write for Bulletin #6868 on the complete line of Condor V-Belts for regular service on conventional V-belt drives. Also write for Bulletin #6628 on R/M Super-Power V-Belts with 40% more Horsepower capacity where needed.

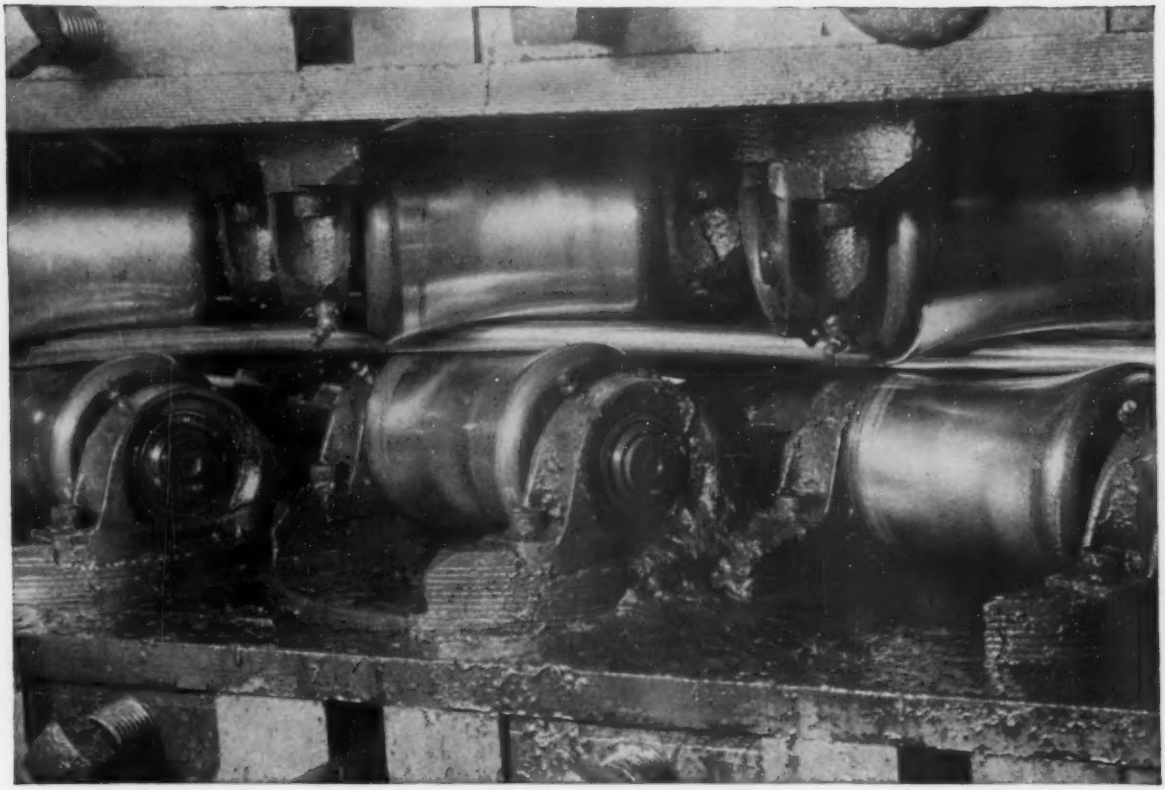
**Poly-V is a registered Raybestos-Manhattan trademark*

RM 640

MANHATTAN RUBBER DIVISION—PASSAIC, NEW JERSEY

RAYBESTOS-MANHATTAN, INC.

Other R/M products include: Industrial Rubber • Fan Belts • Radiator Hose • Brake Linings • Brake Blocks • Clutch Facings Asbestos Textiles • Packings • Engineered Plastic, and Sintered Metal Products • Laundry Pads and Covers • Bowling Balls



Uses tool steel that outwears others 3 to 1 for its straightener rolls

TO help its customers get the longest possible life out of the rolls used in its small tube straighteners, Mackintosh-Hemphill Division of E. W. Bliss Co. makes them from Graph-Mo® steel.

Graph-Mo contains millions of tiny particles of diamond-hard carbides. As a result, users report it outwears other tool steels on an average of three to one!

Graph-Mo steel also contains free graphite which gives it outstanding anti-friction properties, prevents pick up and scoring. This is a big advantage to users of small Mack-Hemp straighteners because it results in a better surface on the products being processed. What's more it eliminates chrome plating the rolls, which is usually necessary when the straighteners are used for non-ferrous metals such as brass.

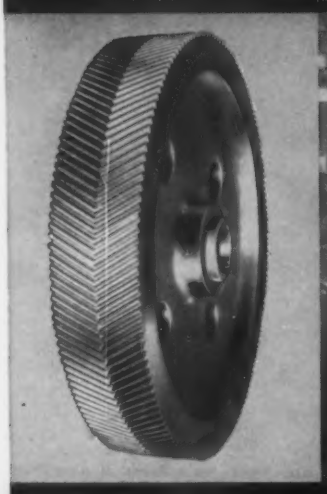
Graph-Mo steel gives Mackintosh-Hemphill two other important manufacturing advantages. It saves machining time because it's 30% easier to machine than ordinary tool steels. And it simplifies heat treating because of its uniform response to heat treatment.

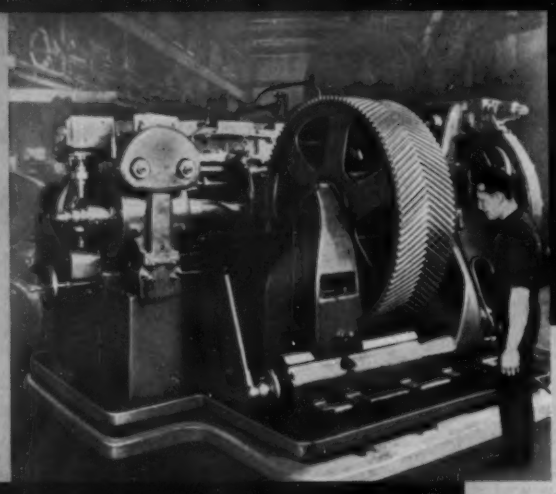
Graph-Mo is one of four graphitic tool steels developed by the Timken Company. If you want more information about their use in dies, punches, gages and machine parts, write for the new Timken Graphitic Steel Data Book. The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

YEARS AHEAD—THROUGH EXPERIENCE AND RESEARCH

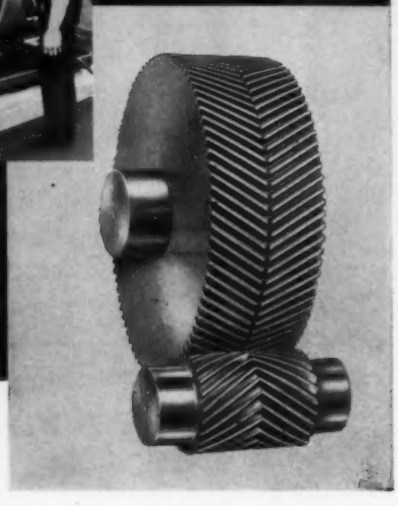
SPECIALISTS IN FINE ALLOY STEELS, GRAPHITIC TOOL STEELS AND SEAMLESS TUBING

HERRINGBONE GEARS





c-o-n-t-i-n-u-o-u-s TOOTH TYPE



for HEAVY SHOCK LOADS AT HIGH *SPEEDS*

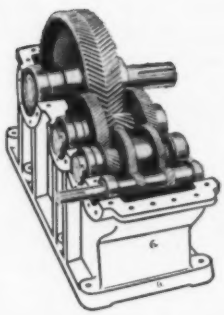
Philadelphia gears for every purpose

- Spur
- Spur Internal
- Helical
- Helical Internal
- Herringbone
- Worm
- Spiral-Bevel
- Hypoid
- Zerol
- Coniflex Bevel
- Racks
- Splines
- Sprockets

Continuous tooth herringbone gears—cut without separation between the opposing helical tooth surfaces—have no equal in gear capacity. They afford greater active face width, greater speed capacity, quieter operation than conventional double helical gears of equal size.

Philadelphia Herringbone gears are indicated for heavy load service, or where tough, continuous operation, shock and/or vibration are factors. Often referred to as "gears with a backbone", Philadelphia Herringbones offer extremely smooth power transmission in sizes up to 2 D.P.; 60" diameter, 18" face width. They create no end thrust, since the opposing helices counterbalance each other.

When specifying gear drives or speed reducers—insist upon Philadelphia, the most honored name in gearing for more than 60 years.



Triple reduction Philadelphia Herringbone Speed Reducer

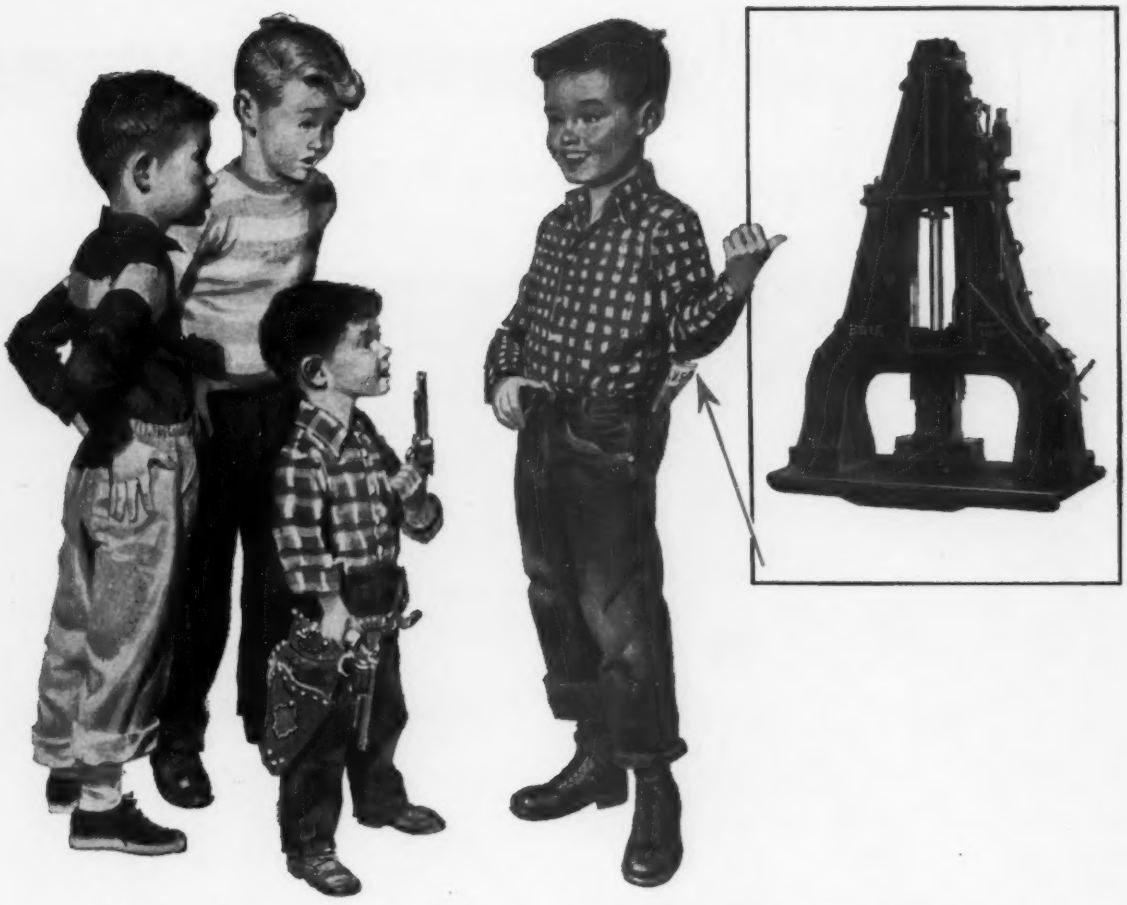
PHILADELPHIA GEAR WORKS, INC.

ERIE AVE. & G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.
BALTIMORE • CLEVELAND
Virginia Gear & Machine Corp. • Lynchburg, Va.

Industrial Gears & Speed Reducers

LimiTorque Valve Controls

Established 1892



"..and this, Rangers is my dad's brand new 10,000-lb. double frame hammer complete with redesigned valves, larger port openings through valves, and streamlined steam passages!"

Pretty impressive stuff to a kid! But chances are your plant won't let the small fry near enough to even sneak a look at those big steam hammers. So here at Erie we've decided to give the kids a break. We've put out a book in their language—with pictures!—telling them all about forging from the crudest cave-man anvil and hammer to the latest hydraulic press. They'll learn a lot . . . and you . . . you'll be more a hero in their eyes than ever! Send now for your free copies of "Forgeland, U.S.A." Send, also, for descriptive technical booklets available on all Erie Hammers —Steam, Board Drop, Single Frame and Double Frame—yours for the asking—just write us.

ERIE

ERIE FOUNDRY CO. ERIE, PA.

"OUR 61st YEAR"

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NEW! MASTERFULLY ENGINEERED

excels in large, heavy tonnage

One-point suspension. 100 through 1000-ton capacities.

Four-point suspension. 200 through 1000-ton capacities.

ECCENTRIC DRIVE DELIVERS GREATER TORQUE WITH LESS DEFLECTION

In Niagara Series SE Presses, the eccentric is an integral part of the main gear (or gears) which rotates on a stationary pin rigidly supported in the crown, close to the point at which the pressure is exerted. Serving merely as a pivot, the pin carries no torsional load and relatively little bending load. Net result: Niagara's eccentric gear design can deliver greater torque with less deflection than other types of construction.

RUGGED, RIGID, ALL-STEEL FRAMES PROVIDE GREATER ACCURACY, LONGER DIE LIFE

Frames are rugged, all-steel, four-piece, tie-rod construction of great strength and rigidity, stress relieved in a furnace and thoroughly grit-blasted before machining. Each frame size has been scientifically tested for deflection to meet Niagara standards—the most exacting in the industry.

LOW INERTIA, PNEUMATIC FRICTION CLUTCH RUNS COOLER, WEARS LONGER

Most of the weight of the Niagara clutch continues to rotate with the flywheel. Only the drive shaft and driving plate start and stop with each cycle. The resulting low weight and inertia of the parts, picked up during clutch engagement, greatly reduce heat and wear. As the clutch rotates, it acts as a centrifugal blower, providing positive ventilation. Plates automatically compensate for normal wear, with no adjustment necessary.

MODERN, STREAMLINED DESIGN EMPHASIZES COMPACTNESS

The entire driving assembly is neatly housed in the crown. There is no exposed, overhanging flywheel, clutch, brake, shaft nor motor in the rear of the press to obstruct crane service, block light, throw grease or consume space unnecessarily.

LINE OF METALWORKING CHAMPIONS

drawing, punching and blanking work

Two-point suspension. 200 through 1000-ton capacities.

Without equal in engineering design, performance and stamina, this great new line of Niagara Straight Side Eccentric Geared Presses is every inch a champion. It is an outstanding example of the advanced thinking that has made Niagara the pace-setter among builders of metal working machines for 75 years.

Masterfully engineered and ruggedly constructed to handle a tremendous variety of work, the new Niagara SE Series is the most practical and dependable press line built for:

- Work requiring large die areas.
- Heavy tonnage demands.
- Long stroke, deep drawing jobs where work is engaged high up on the stroke.
- Bottom-of-stroke blanking and punching.

THE COMPLETE STORY IS READY FOR YOU NOW!
Make a feature-by-feature appraisal of what these great new presses can do for you. Write for newly published, illustrated Bulletin 66. It will be forwarded promptly without obligation.

NIAGARA MACHINE & TOOL WORKS • BUFFALO, 11, N.Y.
DISTRICT OFFICES: DETROIT • CLEVELAND • NEW YORK • PHILADELPHIA
Dealers in principal U. S. cities and major foreign countries.

DELUXE OPERATING CONTROLS INSURE UTMOST SAFETY, EFFICIENCY AND CONVENIENCE

Compactly and conveniently arranged on a master panel, Niagara controls are instantly accessible for fingertip direction of every press operation: starting, slide adjusting, jogging, die tryouts, running and stopping. The latest safety devices provide maximum protection for die setter, operator and the press itself. Nothing has been overlooked. Trial runs assure that all controls are in proper working order before each Niagara press leaves the plant.

NIAGARA

STRAIGHT SIDE
ECCENTRIC GEARED
PRESSES

America's Most Complete Line of Presses, Shears, Machines and Tools for Plate and Sheet Metal Work

I'll tell you why . . . because they're designed to take all the punishment of mass-production plating—and last far longer. Hanger assembly is built extra rigid to reduce maintenance. It slips right into those new-type saddle brackets on the tank for extra strong support plus greater ease in handling. That's a typical H-VW-M performance-proved feature.

And no matter what the plating problem there's an H-VW-M Mercil Type Cylinder built for the job. For example . . . Plexiglas, with ribless, one-piece, convex panel construction—ideal for temperatures to 180°F. . . . or Melamine, for use in temperatures to 210°F. Every type is available in a wide variety of sizes—with a broad choice of contacts—in addition to the standard flexible dangler. Individual motor drive is standard equipment, although bevel-gear drive is available if desired. You'll get a better plated product from these barrels—a more uniform deposit—*much more economically.*

Plating barrels are just one of many results of over eighty years of constant plating development — a continuing policy summed up in H-VW-M Platemanship . . . your working guarantee of the best that industry has to offer— not only in plating barrels—but in every phase of plating and polishing.

8655

Photo courtesy of H. L. Judd Co., Wallingford, Conn.

For full information on H-VW-M Mercil Type Plating Barrels ask for Bulletin PB-108.

Your H-VW-M combination—of the most modern testing and development laboratory—of over 80 years experience in every phase of plating and polishing—of a complete equipment, process and supply line for every need.

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TOCCO heating station with inductor and fixture for silver brazing cylinder and cylinder cap assemblies.

with TOCCO* Induction Heating

The experience of The Commercial Shearing and Stamping Company, who use TOCCO for silver-brazing hydraulic cylinder assemblies, is typical of the benefits obtained by America's leading metal-working plants who use TOCCO Induction Heating for brazing, hardening, heat-treating, forging and melting operations.

More Production with TOCCO

a. Heating time per piece cut from 15.3 minutes to 2 minutes on 5¼" I.D. cylinder.

b. Machining and cleaning operations, formerly required, are not needed after TOCCO brazing.

Lower Costs with TOCCO

a. Through a reduction in time required for each piece.

b. Through the elimination of scrap and reworks.

c. Because, since TOCCO is automatic, operator need not be trained or especially skilled.

Improved Product with TOCCO

a. Because of better looks and sales appeal.

b. Because distortion is minimized.

c. Because of elimination of field failures due to severe stress pockets.

TOCCO Engineers— can probably find applications in your plant, too, where TOCCO Induction Heating can increase output, cut unit costs and improve your product. Such a survey costs you nothing—and may save you a great deal.

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Dept. A-3, Cleveland 1, Ohio

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friction surfaces need PARCO LUBRITE

Wear is a problem wherever two surfaces slide or roll against each other. Parco Lubrite, one of the Parker line of surface treatments for metals, *retards* wear on iron and steel.

Parco Lubrite converts the surface of metal parts to a non-metallic phosphate coating that is oil absorbent, holding lubricant even under high unit pressures. In initial operation the Parco Lubrite coating prevents metal-to-metal contact, and break-in is quick, easy and smooth, without galling or scoring.

Parco Lubrite treated parts can be expected to have longer service life, too. You will want to know just how Parco Lubrite can contribute to the performance of the friction parts in your product. **Write today for full information.**

PARKER RUST PROOF COMPANY
2186 E. MILWAUKEE, DETROIT 11, MICHIGAN

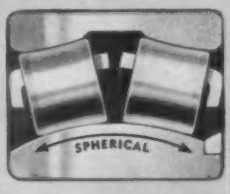
BONDERITE	BONDERITE and BONDERLUBE	PARCO COMPOUND	PARCO LUBRITE	TROPICAL
corrosion resistant paint base	aids in cold forming of metals	rust resistant	wear resistant for friction surfaces	heavy duty maintenance paints since 1883

MORE FACTS on why more and more leading manufacturers choose Link-Belt bearings

SUPER-RUGGED CAST STEEL HOUSING. Proper positioning of cap on base is assured by large-size dowels. Four heat-treated thru-bolts and serrated steel nuts firmly clamp cap and base together.

CHOICE OF SEALS. Spiral labyrinth steel seals, left, are for oil or grease lubrication and heat conditions. Combination felt and synthetic rubber contact-type seals, right, for grease lubrication.

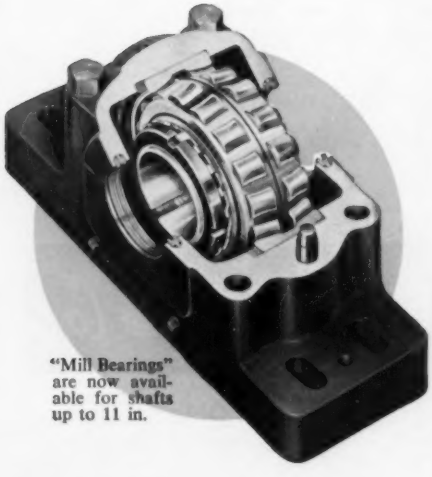
SELF-ALIGNING ROLLER BEARING is self-contained and adjusted at the factory—needs no shims or alignment rings at installation. Design assures free rolling under even the toughest conditions.



Link-Belt "Mill Bearings" with cast steel housings withstand severe impacts and heavy loads in this modern pipe mill.

"Mill Bearings" with cast steel housings

designed by Link-Belt to take industry's heaviest loads and hardest impacts



"Mill Bearings" are now available for shafts up to 11 in.

● To stand up to the sudden shocks and impact loads met in steel mills, mines, foundries, oil field applications and on heavy equipment, Link-Belt has designed the extra tough "Mill Bearing." It's the precision Link-Belt self-aligning roller bearing mounted and protected in a durable cast steel housing.

Thoroughly-proved Link-Belt "Mill Bearings" maintain full load capacity even with shaft deflections and misalignment often existing in extremely heavy service. And their simple, efficient design assures long life and free rolling.

Link-Belt makes industry's most complete line of ball and roller bearing blocks. So whatever you need, you'll find the answer in this quality line. Ask any of the 40 Link-Belt offices or an authorized stock-carrying distributor for Data Book 2550 and Book 2565A on "Mill Bearings."

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LINK-BELT

Ball and Roller Bearings

LINK-BELT COMPANY: Executive Offices, Prudential Plaza, Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

Don't call NAMES—
Call "ELL" & "ESS"!

Down, boys, down. There's a better way to settle that difference of opinion.
Call "Ell" & "Ess"—Lamson & Sessions, to you—and we'll tell you
the best, most economical way to solve that fastener problem.
When it comes to bolts and nuts, we've got the answers. Our
files are bursting with "how to fasten it" data . . . and
we're bursting to share it with you.
So before you get hot under the collar, get hot on the phone . . .
and call in those helpful fastener fellows "Ell" & "Ess".
It will save time, trouble and tempers!
And remember, there's no charge for "Ell" & "Ess" service. It's yours for the asking.

The LAMSON & SESSIONS Co.

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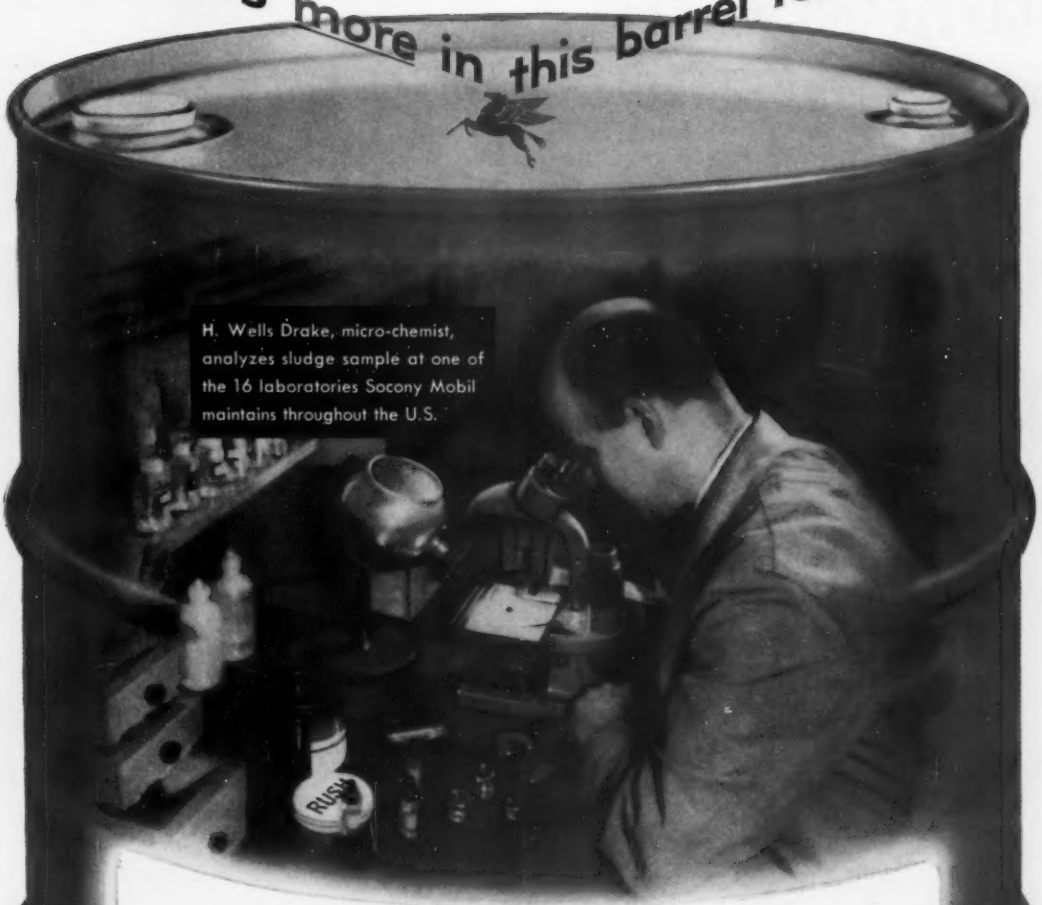
There's more in this barrel for you...



H. Wells Drake, micro-chemist, analyzes sludge sample at one of the 16 laboratories Socony Mobil maintains throughout the U.S.

MORE ANALYTICAL SERVICE

to help you improve production and cut costs!

Socony Mobil offers far more analytical service than any other oil company . . . more laboratories to provide you with detailed performance data on the Mobil products you use in your plant. This service also includes recommendations which can materially help improve your production and lower unit costs.

Socony Mobil products are also backed by *more* field engineers serving industry . . . *more* continuous research to assure continually improved products . . . *more* on-the-job training of your personnel in correct product application . . . *more* approvals from machine builders . . . *more* practical experience—90 years.

Always specify Socony Mobil. There's *more* in every barrel for you!

SPECIFY **SOCONY MOBIL** FIRST STEP IN CUTTING COSTS

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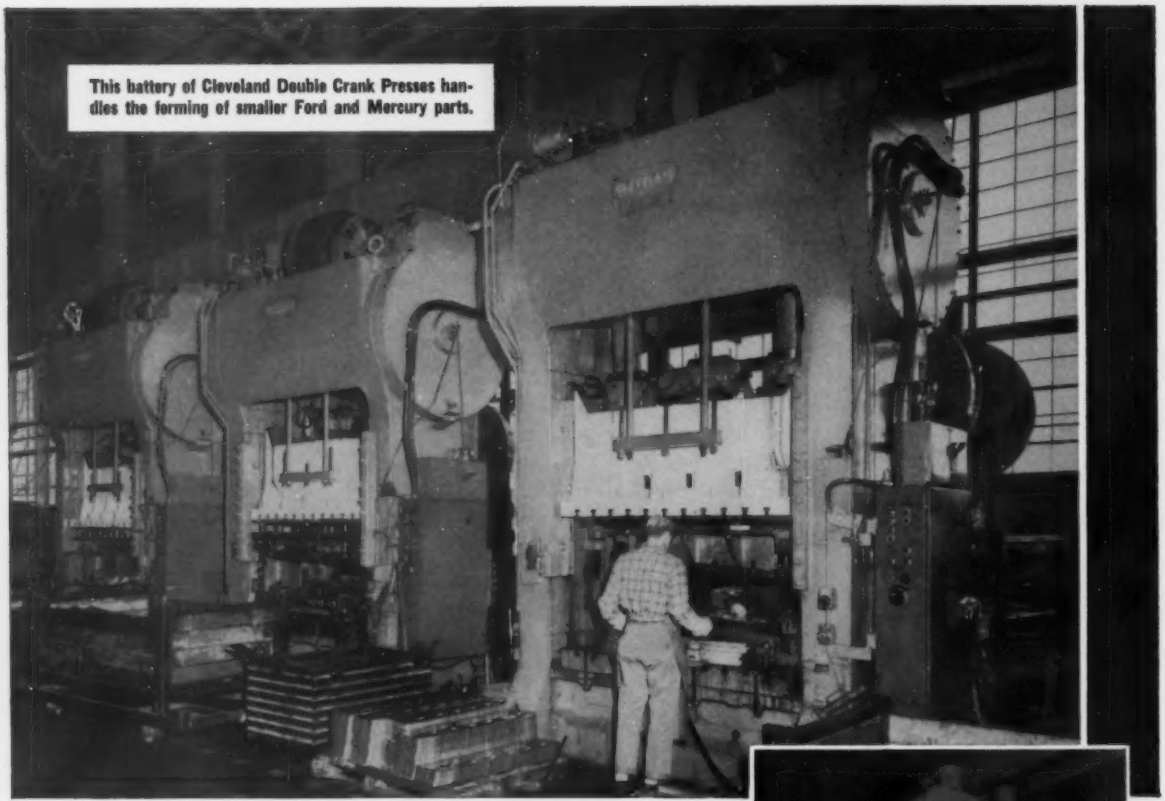
LUBRICANTS • FUELS • CUTTING FLUIDS • WAXES • SOLVENTS • PLASTICIZERS • PETROCHEMICALS

CLEVELAND PRESSES

help Ford produce 120 carloads of stampings daily

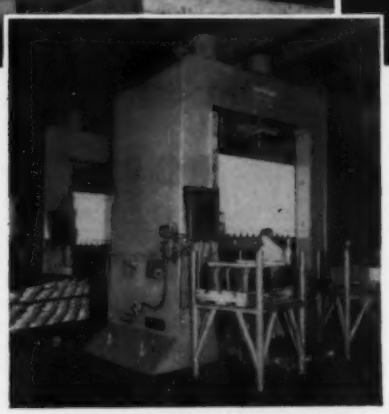
Ford's Cleveland Stamping Plant.



This battery of Cleveland Double Crank Presses handles the forming of smaller Ford and Mercury parts.

Since its completion in August of 1954 Ford's Cleveland Stamping plant has been producing Ford, Mercury and Lincoln parts at the rate of 120 carloads a day. Continuous part flow is essential to meet Ford's exactly scheduled assembly lines.

If you're interested in improving your stamping production be sure to check the many advantages designed into each of the 11 specialized types of Cleveland Presses. You'll find that new Cleveland Presses designed to your specific requirements will give you lower operating costs for greater profits. Write or call today.



Two Cleveland 450 ton Underdrive Presses head the production line forming Ford package trays.

THE CLEVELAND PUNCH & SHEAR WORKS CO.

Established 1880

POWER PRESSES – FABRICATING TOOLS

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Offices at: NEW YORK • CHICAGO • DETROIT
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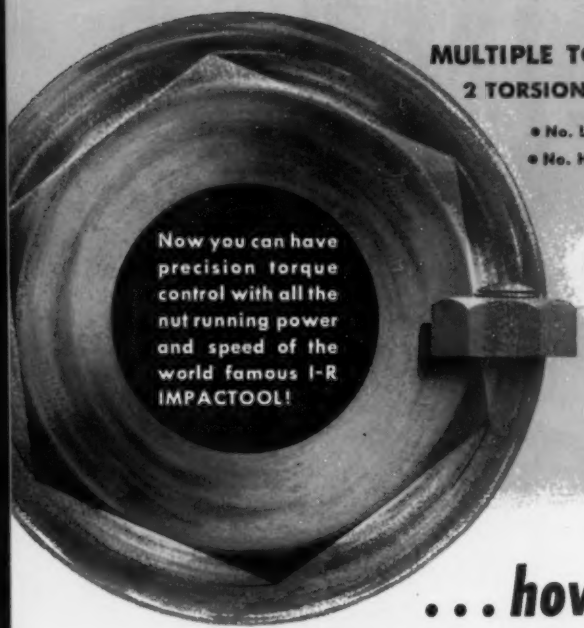
CITY FOUNDRY DIVISION • SMALL TOOL DEPARTMENT

NEW! Revolutionary AIRengineering Development by Ingersoll-Rand..

TORSION BAR Torque control IMPACTOOLS



Now you can have precision torque control with all the nut running power and speed of the world famous I-R IMPACTOOL!

MULTIPLE TORQUE SETTINGS
2 TORSION BARS AVAILABLE:

- No. L735. Max. torque 60 ft. lbs.
- No. H735. Max. torque 90 ft. lbs.

Size 5040T*

*For torques up to 550 ft. lbs., a Size 5340T *Torque Control* Impactool is available

...how can YOU use these ADVANTAGES ON NUT RUNNING JOBS where prescribed torques must be met?

- **POSITIVE TORQUE CONTROL**—a revolutionary use of a rugged steel torsion bar for precision control of torque—combined with the power and speed of the Impactool.
- **SIMPLE TORQUE SETTING**—torsion bar adjusting sleeve is clearly calibrated for changing torque with easy-to-use torque jig.
- **TORQUE SETTING REMAINS CONSTANT**—for any nut running condition until the adjustment is changed.
- **ELIMINATES "OVER-TORQUE"**—impact mechanism rebounds instantly when preset torque is reached, tripping a foolproof rubber faced shutoff valve.
- **LOW MAINTENANCE**—combines many of the proven features of Ingersoll-Rand Impactools, with their enviable record of dependable performance and low maintenance.
- **REVERSIBLE**—full power in either direction.
- **NO CLUTCH**—to wear, slip or require adjustments.

Torque can be quickly and easily set, using the jig as shown above. The torsion bar automatically shuts off the tool when the nut running resistance becomes equal to the stress in the preset torsion bar.

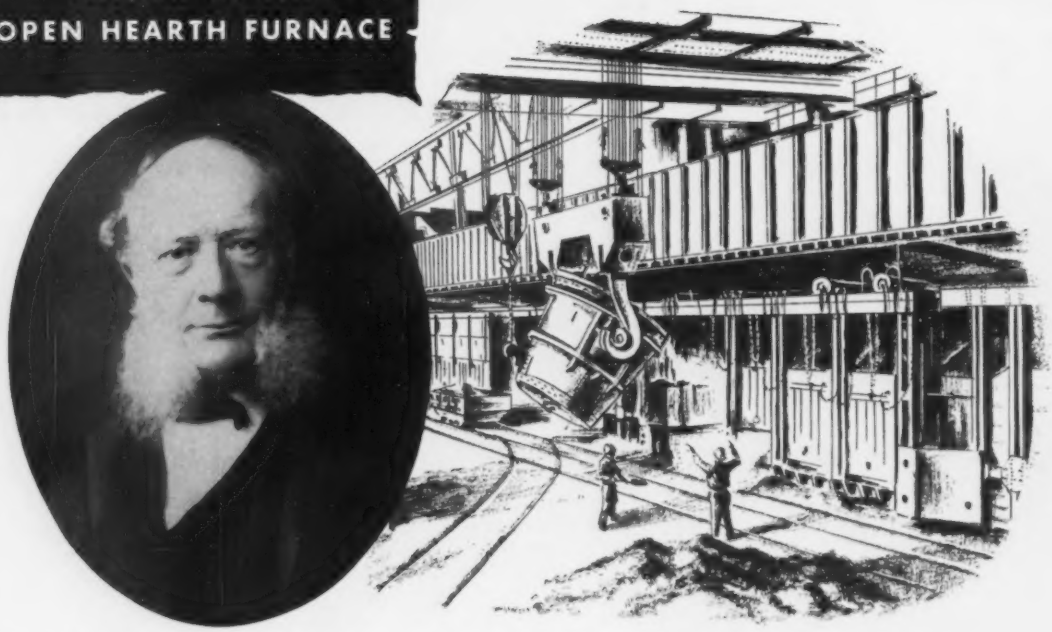
Ask your Ingersoll-Rand AIRengineer for a demonstration now . . . or write direct for more information on this amazing development.

Ingersoll-Rand
Impactool Division
11 Broadway, New York 4, N.Y.

8-305

FAMOUS FIRSTS IN THE IRON & STEEL INDUSTRY

FATHER OF THE OPEN HEARTH FURNACE



When Karl Wilhelm Siemens designed his regenerative furnace for glass manufacturing in 1861, he saw the possibilities of his furnace in the production of steel. Siemens granted a license to Pierre and Emil Martin of Sireuill, France, and in 1864 they built what is thought to be the first successful open hearth furnace.

Around 1867, J. T. Potts, Karl Siemens' engineer was building a regenerative furnace to melt crucible steel at the Anderson, Cook and Company plant in Pittsburgh. Assisting Potts was Samuel T. Wellman, an American engineer. Wellman was sent in 1869 to the Bay State Iron Works in South Boston, Massachusetts to build the first successful open hearth completed in the United States. A furnace with five ton capacity went into operation early in 1870. The good news got around quickly. In 1871 a furnace was built in Nashua, New Hampshire, and at the Singer, Nimick & Co., in Pittsburgh.

By 1909 open hearth production surpassed that of Bessemer process, and today it accounts for approximately 91% of all the steel made in the United States.

The first producer of dead-burned dolomite is The J. E. Baker Company. Since its beginning BAKER'S MAGDOLITE offered steel producers more uniform ingots, increased furnace efficiency at lower refractory costs. BAKER'S MAGDOLITE is always 5 ways better: Composition, Preparation, Strength, Economy, and Quality. The next time you order dolomite, specify BAKER'S MAGDOLITE, the original dead burned dolomite.

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8-55

ANOTHER FAMOUS FIRST

JEBCO PRODUCTS SINCE 1889

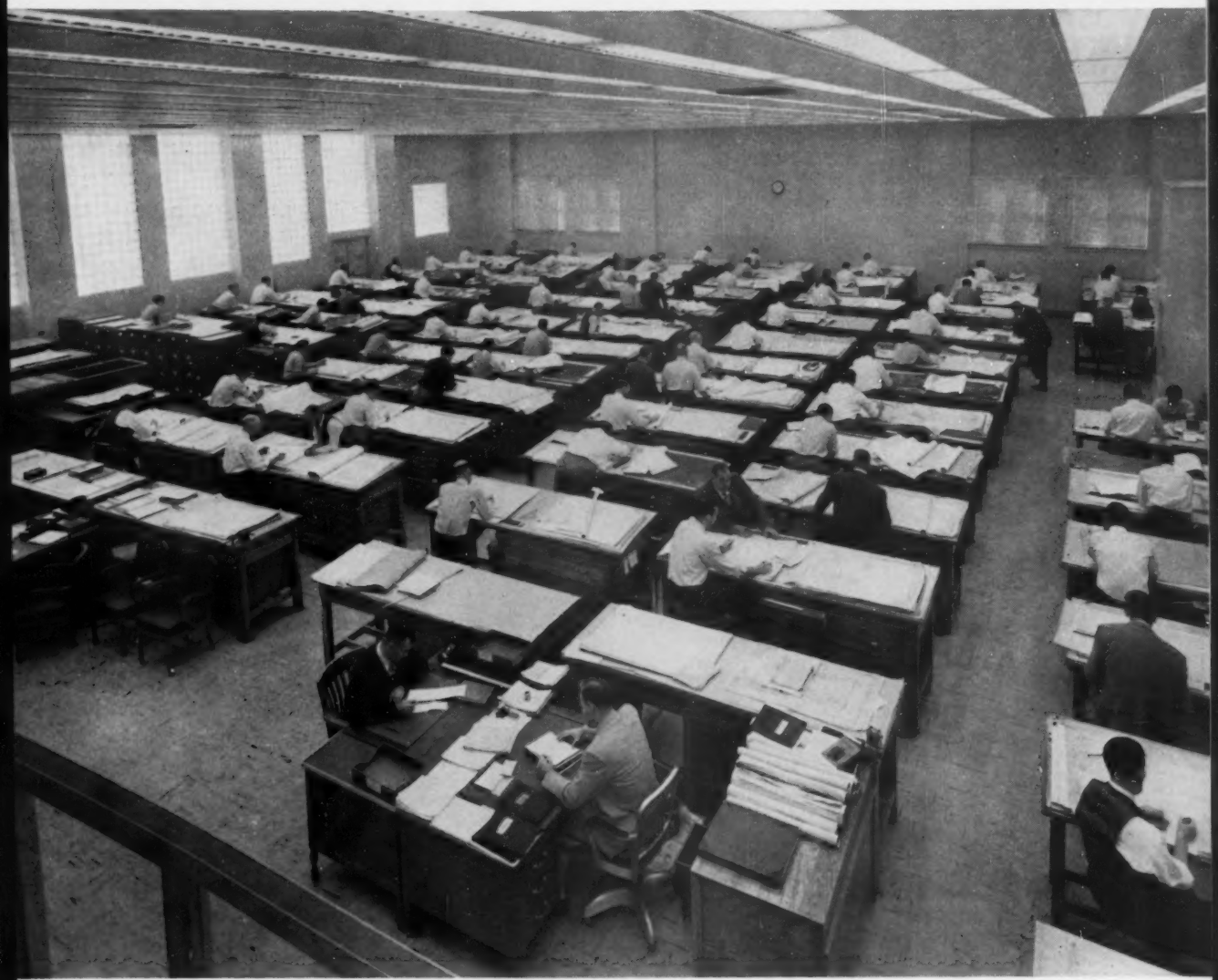
BAKER'S MAGDOLITE

The original dead-burned dolomite

THE J. E. BAKER COMPANY

YORK, PENNSYLVANIA • PLANTS: BILLMEYER, YORK, PENNSYLVANIA • MILLERSVILLE, OHIO

54 YEARS OF DESIGNING AND BUILDING EQUIPMENT



One section of Aetna-Standard's big engineering staff

men at work for ONE PURPOSE

To develop better equipment and more efficient equipment for production of steel, copper, brass, aluminum, in the form of higher quality pipe and tubing, tin plate, galvanized sheet and strip, cold drawn bars and tubes and many other products.

These engineering **idea men** have one purpose — to transform ideas into equipment as exemplified by the Rotary Hot Saw, the Tube Expander, the 5-Draw Drawbench and many ideas of Continuous Galvanizing, Continuous Electrolytic Tinning and Finishing Equipment.

They do not work alone. Many of the ideas for new equipment originate with you, the customer. The Aetna engineering idea staff refines and develops the idea into equipment. This ability to work with customers is one of Aetna's best assets. . . . That's why Aetna-Standard always has been known as **the idea people.**

AETNA • STANDARD

THE AETNA-STANDARD ENGINEERING COMPANY

GENERAL OFFICES: PITTSBURGH, PA. PLANTS: ELLWOOD CITY, PA., WARREN, OHIO

CONTINUOUS GALVANIZING LINES • CONTINUOUS ELECTROLYTIC TINNING LINES • SIDE TRIMMING AND SHEAR LINES AND OTHER FINISHING EQUIPMENT • CONTINUOUS BUTT WELD PIPE MILLS • SEAMLESS TUBE MILLS • DRAWBENCHES AND OTHER COLD DRAW EQUIPMENT • ROLLS AND CASTINGS • EXTRUDERS, MILLS, PRESSES FOR RUBBER AND PLASTIC

AXELSON production and maintenance news

AXELSON MANUFACTURING COMPANY / DIVISION OF U.S. INDUSTRIES, INC. / 6160 SOUTH BOYLE AVENUE, LOS ANGELES 58, CALIFORNIA

New 32″ heavy-duty lathe has 75-hp headstock... handles peak loads to 100 hp.

Axelson's new 32″ heavy-duty lathe is a rugged tool that can be used with equal effectiveness on rough or precision cuts. It has 24 spindle speeds in true geometric progression from 6 to 750 r.p.m.

The main bed casting is designed for maximum stability and for resistance to the twisting forces of heavy-duty turning. The carriage bed ways are hardened and ground alloy steel.

Two levers control the selection of feed changes on the new Axelson totally enclosed gear box. There are 81 feeds, ranging from .005″ to .351″ per revolution of the spindle; 45 threads may be cut, ranging from 1 to 30 threads per inch. This range of feeds and leads is sufficient for the large majority of all machining operations.

The extra-heavy, box-type apron is completely enclosed, which permits all shafts and gears to run in a continuous oil bath. All carriage controls are located on the apron convenient to the operator. Clutch levers operate cross and longitudinal feed controls.

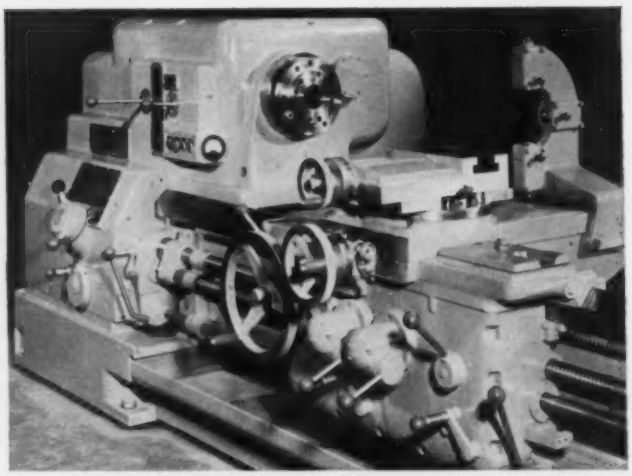
The tailstock is a rugged one-piece casting. The two-speed feature provides rapid movement of the tailstock center up to the work piece, and slow powerful movement of the spindle for feeding drills, reamers, or other tools held in center. The tailstock can be easily moved manually in either direction by a hand crank at the front of the machine.

A micrometer cross-feed positive stop, which permits the operator to set the cross-slide travel to stop at a predetermined point, is positive, will not slip, and will permit accurate dimensions to be duplicated repeatedly.

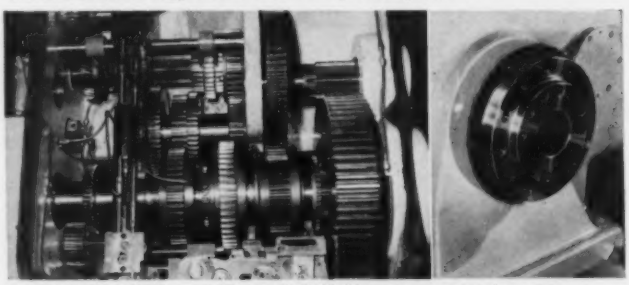
Standard equipment is the power rapid traverse for quickly moving the carriage in either direction. This feature saves valuable production time and reduces operator fatigue to a minimum. A lever mounted at the left-hand side of the carriage controls the carriage movement.

For a complete description and detailed specifications on Axelson Tool Room, Medium-Duty and the new 25/16 and 32″ Heavy-Duty Lathes: Write for buiietin I3-5507 and 5504.

AXELSON Manufacturing Company
Division of U. S. Industries, Inc.



NEW 32″ HEAVY-DUTY LATHE. Designed for flexible, effective operations, this machine combines rugged construction and precise operation.



HEADSTOCK. Twenty-four spindle speeds divided into a true geometric progression from 6 to 750 r.p.m. are ideally suited for a wide variety of work, permitting high speed turning and large diameter work in new metals and alloys.

SPEED SELECTION. Two levers make speed selection simple and fast. Position of the levers tells operator the speed at which spindle is running or the speed change desired. Automatic electric brake stops spindle instantly.

Straightening Spring and N-A-X Tensile Steels at Great Lakes Plant, Ecorse, Mich.

K&R Two-Plane Straightener

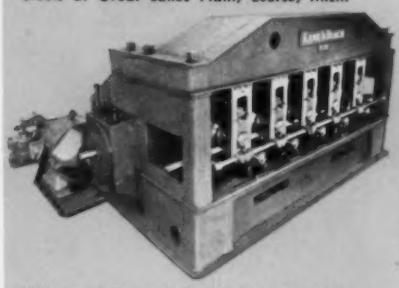
gives 2-machine performance in one operation

N-A-X

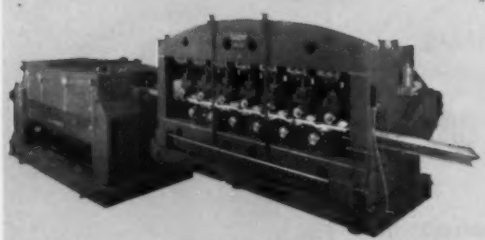
NATIONAL STEEL CORPORATION

The K&R No. 2B-15 Roll Comb. Vert. and Hor. Straightening Roll, Type B, shown in use at the Great Lakes Steel Corporation, Detroit, Michigan, Division of National Steel Corporation, has continued to give satisfactory service since its installation in 1936. This Two-Plane straightener gives the flexibility of operation needed for edge and flat straightening of rectangles, squares, hexagons and other shapes. Flexibility that gives you the advantage of two-machine operation in one pass. *Illustrated are the modern K&R 2B Straightening Rolls, both Two Plane and Single Plane Types.*

Learn how K&R Machinery can cut costs and boost production in your plant. Our engineers will furnish recommendations, operating data, estimates—no cost, no obligation. Write or wire today.



2B-10 Roll Hor. Shaft Straightening Roll, Type B, shown at maximum longitudinal centers, above, and minimum longitudinal centers, below.



2B-24 Roll Comb. Hor. Straightening Roll, Type B.

2B-16 Roll Comb. Hor. and Vert. Straightening Roll, Type B.

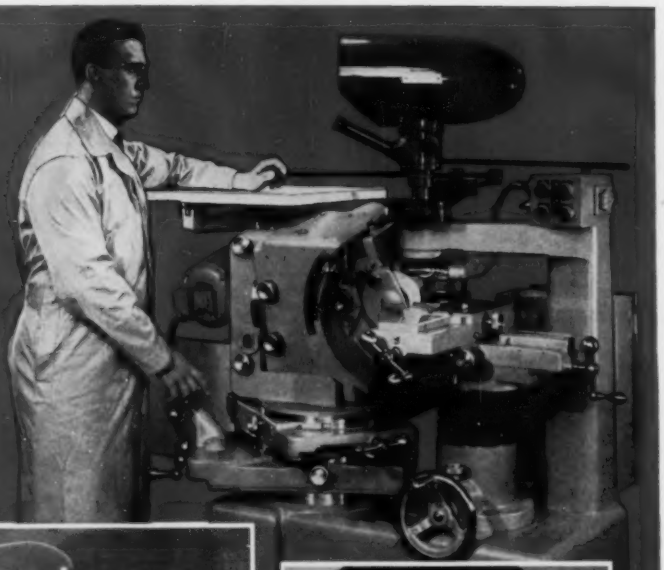
Metal Working Machinery Since 1887

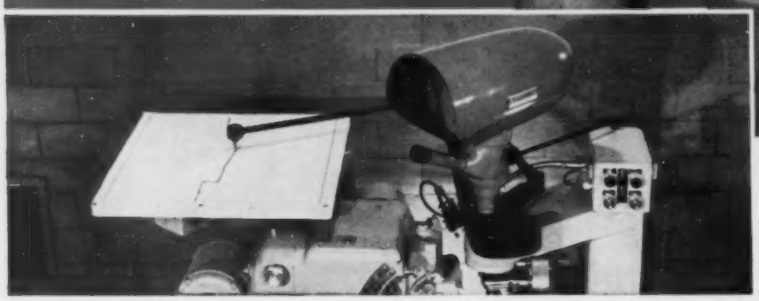
Cold Roll Forming Machines
Bending Rolls · Straightening Rolls
Slitting Lines · Flying Shears & Saws
Special Metalworking Equipment

Kane & Roach
INCORPORATED
SYRACUSE, NEW YORK • ESTABLISHED 1887

Grind High Precision Profiles Directly from the Drawing *with*

SHEFFIELD'S MICRO-FORM GRINDER





FEATURES

- Grinds both flat and circular profiles
- No restrictions on profile intricacy
- No templates needed
- Perfect toolroom accuracy
- Saves up to 75% on profile work
- Final accuracy checked while work is still on the grinder
- Accuracy not affected by wheel wear
- No special wheel dressing required as wheel can be set at any angle—fewer wheels are needed
- Diamond impregnated wheels used in grinding carbides last longer—no waste as no special dressing is required
- Multiple work parts ground simultaneously
- Grinds any material including carbides
- Controlled by 50:1 pantograph and 30 power scope and viewing screen

The Sheffield Corporation
Dayton 1, Ohio, U.S.A.

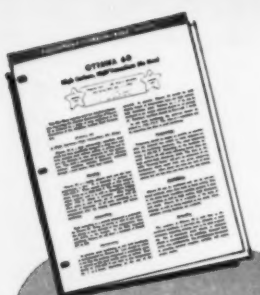
For full details and specifications ask your Sheffield representative for Bulletin MFG-122-51 or write us direct.

7144

MASTER CRAFTSMAN GOLDEN ANNIVERSARY HEADQUARTERS

SHEFFIELD

manufacture and measurement for mankind



Write for a copy of the OTTAWA 60 BLUE SHEET

This Blue Sheet contains certified data on the physical characteristics of Ottawa 60, prepared from carefully checked laboratory and field service tests. All the information you'll need on methods of handling and heat treatment, etc.

ADDRESS DEPT. A-75

OTTAWA 60 is a *new* die steel, an A-L "original," developed primarily to deep draw and form stainless steel. As intended, it performs without galling or pickup and shows exceptional wear resistance in that service. We have plenty of case histories to show you in proof.

But *wherever* you use Ottawa 60 draw dies—not just on stainless steel—this high-carbon, high-vanadium alloy comes through for you. Illustrated above are the first and second draws on transformer housings, produced from .037" gauge SAE 1010 strip. The company formerly used dies made of 5% chrome air-hardening die steel—and later a more highly alloyed material—without ever getting more than about 2000 pieces before the dies began to show gall marks and pickup, and parts were rejected due to scoring, breakage and oversize. *Dies made from Ottawa 60 forgings cured that! Results after 25,000 pieces showed no pickup and no wear on punch or die.*

● You can solve many a problem and save real money with Ottawa 60 draw dies! Write for information or call in our Field Service Staff to help you get started. ***Allegheny Ludlum Steel Corporation, Oliver Bulding, Pittsburgh 22, Pa.***

For complete MODERN Tooling, call

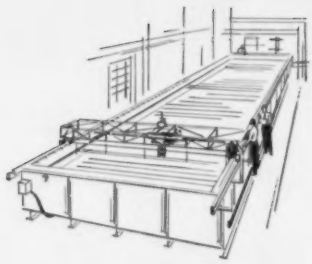
Allegheny Ludlum

WAD 5463

AL® FINE TOOL STEELS SINCE 1854

THIS ULTRASONIC DETECTIVE

"Sounds Out" Flaws in Metals



CURTISS-WRIGHT *non-destructive* ULTRASONIC TEST EQUIPMENT

Speeds Precision Inspection in Wide Range of Industries

Curtiss-Wright Non-Destructive Test Equipment uses "ultrasound"—high frequency mechanical vibrations—for precision production-quantity inspection of forgings, rolled plate, welded tubing, extrusions and other metal products.

A "search crystal" immersed in water is electrically excited to produce several million cycles per second. The resultant vibration passed through the liquid readily penetrates metals . . . then bounces back from the front or rear surface of, or from interior flaws in, the material. The flaws are translated into "pips"—visible readings on the cathode ray tube of the Curtiss-Wright Immerscope. The Immerscope, most important unit in the Curtiss-Wright test system, has a built-in alarm system which provides positive warning when flaws of a predetermined size are present. Scanning equipment for cross-sectional views, and a Flaw Recorder for keeping a permanent record of all data, are important accessories for complete automation in quality control.

Curtiss-Wright Ultrasonic Test Systems, and other important developments in ultrasonics, are serving many of the nation's leading industries. Complete information and engineering assistance available on request.

ENGINEERS • TECHNICIANS • SCIENTISTS

Curtiss-Wright has permanent career positions open for specialists in advanced engines and propellers, metallurgy, electronics, nucleonics, ultrasonics, plastics and chemistry. New 85-square-mile Research and Development Center at Quehanna, Pennsylvania and expanded divisional engineering programs are creating opportunities for more engineers, technicians and scientists in both aviation and diversified industrial projects. . . . Write to: Engineering Placement Department, Curtiss-Wright Corporation, Wood-Ridge, New Jersey.

INDUSTRIAL AND SCIENTIFIC PRODUCTS DIVISION

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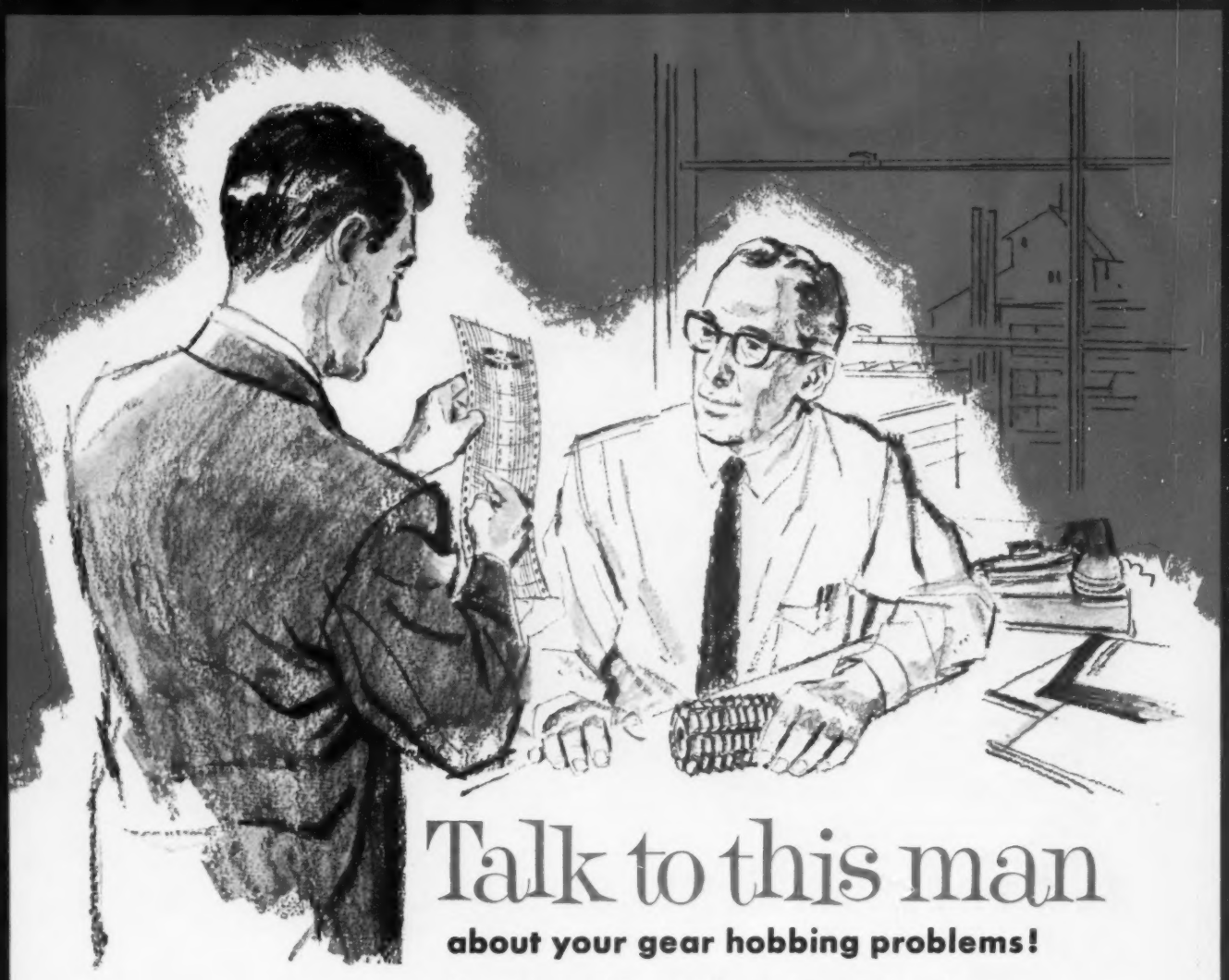
CORPORATION • CALDWELL, N. J.



Talk to this man

about your gear hobbing problems!

He represents 44 years of experience and service in making quality hobs for gear manufacturers.

Because precision gear making is an extremely demanding process, your Illinois Tool Works sales engineer is just the man to see. He knows hobs and hob requirements. Backed by nearly half a century of experience and engineering skill in the production of precision hobs, he can help make your gear generating operations more efficient, less costly. Have him show you the exclusive TOOLGRAPH® chart that accompanies every ground and Certified Unground Illinois Tool Works Hob. It's a visual, electrically produced inspection record that provides positive proof of hob accuracy. Why not talk to the Illinois Tool Works man about your hob requirements?

Write Today! Send for this important data-packed booklet that can help you produce precision gears at lower cost. Ask for the "Certified Unground Hob" booklet.

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Look to your Illinite Distributor for the most complete line of standard end mills, standard milling cutters and special cutters.

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UNIVERSAL IRON WORKER

ALL THESE MACHINES BUILT INTO ONE!

1. SHEAR 2. PUNCH 3. MITER 4. BAR CUTTER 5. NOTCHER 6. COPER

Instead of giving space to a number of machines to do the above operations, you get all on a single base with the "Buffalo" Universal Iron Worker. You save space. You save conveying work from machine to machine. You can do multiple operations without tool changes —up to three operations simultaneously. The *only* machines available with built-in notcher and coper. Rugged electrically welded steel plate frame, not cast iron. One-shot lubrication in most models. Handy hold-downs for fast, accurate work. 5 models to choose from. If you do structural or plate work in your shop, you'll do it faster and cheaper with a U.I.W. Write for Bulletin 360 today or check with your nearby "Buffalo" Machine Tool Dealer.

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SOCKET SCREW PRODUCTS
always measure up!
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Socket screw users who want *what* they want *when* they want it know it pays to specify B-RIGHT-ON! Brighton Socket Screw Products *always* measure up.
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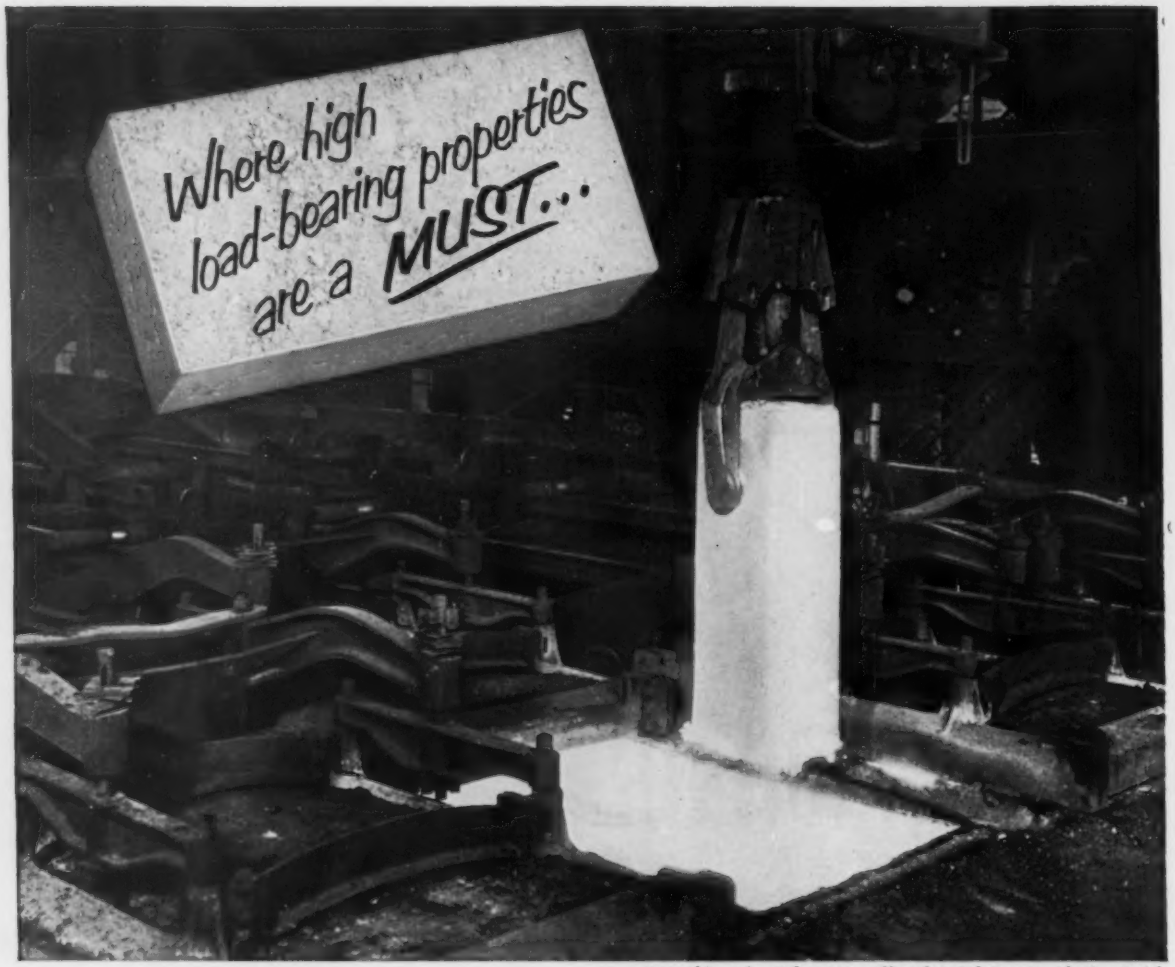


In soaking pits, Johns-Manville Sil-O-Cel C-22 Insulating Brick provide outstanding performance as back-up insulation.

Specify

Johns-Manville SIL-O-CEL C-22 Insulating Brick

the diatomaceous silica brick that retains its high cold crushing strength of 700 psi throughout normal service range

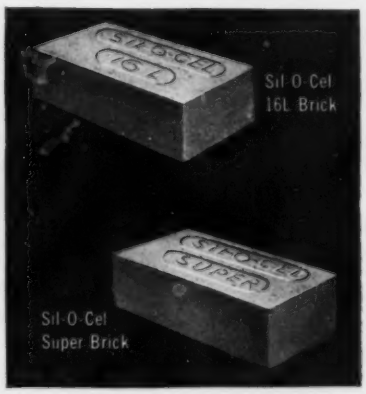
Because of its exceptional strength Sil-O-Cel C-22 Insulating Brick has gained wide acceptance as an all-purpose insulating brick. It is especially recommended for soaking pits, open hearth bottoms, slab heating furnaces, hot blast stoves, coke ovens and other high temperature equipment.

Millions of microscopic cells provide Sil-O-Cel C-22 brick with excellent heat resistance up to 2000F. It has a thermal conductivity of only 1.88 Btu in/sq ft/F/hr at 1000F mean temperature. In addition, with a density of 38 lb/cu ft, it is light and easy to handle.

For direct exposure or back-up to 1600F, use Sil-O-Cel 16L Insulating Brick. This newest member of the J-M diatomaceous silica insulating brick family has *less than 0.1% reversible thermal expansion at 1600F.* Conductivity is 1.07 Btu in/sq ft/F/hr at 1000F mean temperature with a density of 33-35 lb/cu ft. Cold crushing strength is 350 psi. Sil-O-Cel 16L serves equally well as back-up insulation or exposed refractory lining.

For back-up at higher temperatures, specify Sil-O-Cel® Super Insulating Brick with an unusually high temperature limit of 2500F.

Write today for further information on Sil-O-Cel Insulating Brick and Insulating Fire Brick. Ask for Brochure IN-115A. Address Johns-Manville, Box 60, New York 16, N. Y. In Canada, 565 Lakeshore Road East, Port Credit, Ontario.



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To give your steel fabricating customers the precision sheets they require, you must have precision-machined rolls—and there's no better place to get them than from National, where rolls for leading steel producers have been turned out for almost fifty years.

So start your customers off in the right direction—specify National for all your roll requirements.

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Specialists in Iron, Alloy Iron and Steel Rolls, Carbon, Alloy and Manganese Steel Castings

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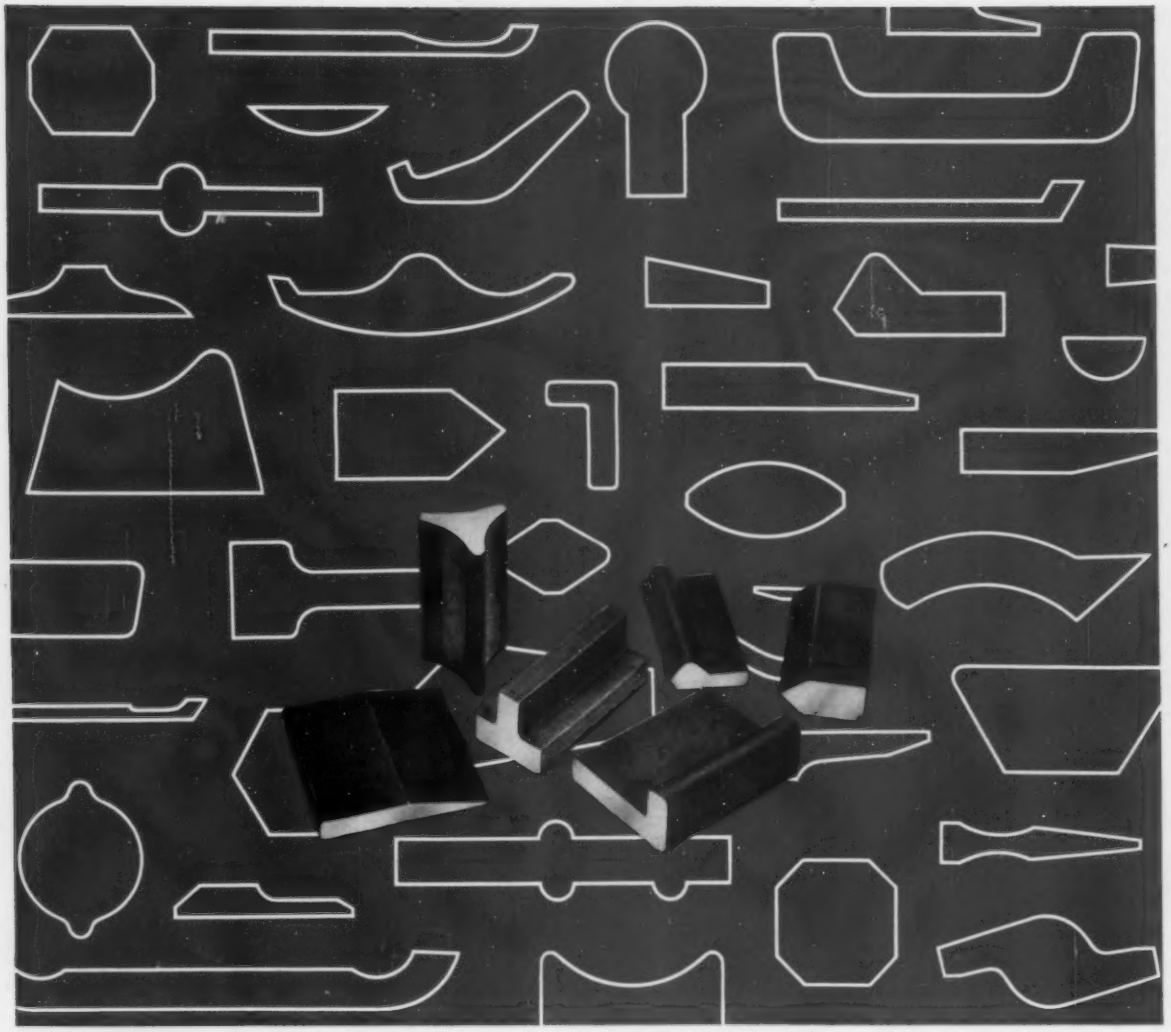

Crucible special shapes

for better special steel parts at lower cost . . .

If you're machining intricate sections from solid bars—or using expensive forgings—stop! Choose instead, a *Crucible special shape* that approximates the finished part. *Crucible special shapes* eliminate rough-machining operations . . . reduce scrap losses.

There's practically no limit to the *special shapes* available at Crucible, in a wide variety of special steels. Rolls for over 400 special shapes are available—other shapes can be rolled to your specifications. Your local Crucible representative can give you the whole story of how *special shapes* can cut costs—save time. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

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Bulky products unitized for faster handling

ACME STEEL STRAPPING helped eliminate slow, costly manual handling of zinc slabs at The Anaconda Company, Anaconda, Montana. Each day over 700,000 pounds of zinc are unitized by stacking and strapping and then loaded in freight cars by lift truck. And it's done in ⅓ the time of former hand loading. (Idea No. U6-3)

Anaconda's customers are also sold on unitizing. Unloading is fast. Inventory is simplified. Storage space is used more efficiently.

***Check YOUR Acme Idea Man today.** He will show you examples of many similar Ideas-In-Action. He can use his experience to adapt these ideas to your needs. Write to Dept. EF-36, Acme Steel Products Division, Acme Steel Company, 2840 Archer Avenue, Chicago 8, Ill. In Canada, Toronto, Ont.

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Choice of hand or
power feed head and table

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assures
*CERTIFIED
ACCURACY

in the NEW

U.S.Vertical
MILLING MACHINE

Balanced rigidity, the key to accuracy for vertical and angular milling operations, is an integral part of the new U. S. Vertical Milling Machine.

These U. S. Vertical features provide rigidity for close tolerance work:

- Machine weighs 2000 pounds
- Extra wide bearing surfaces
- Motor mounted behind column, balances weight of head, resists vibration and deflection
- Major castings are internally ribbed, normalized, stress relieved, and internally braced
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Drive by B section V belt

***Tested 10 Ways!**

The accuracy of each U. S. Vertical Milling Machine is certified. A check sheet accompanies every machine listing 10 exacting operational tests the machine has passed. The check shows allowable tolerances and actual measured tolerances of the individual unit. A new bulletin provides complete specifications and illustrates various accessories available on the new U. S. Vertical Milling Machine. Write for your *FREE* copy today.

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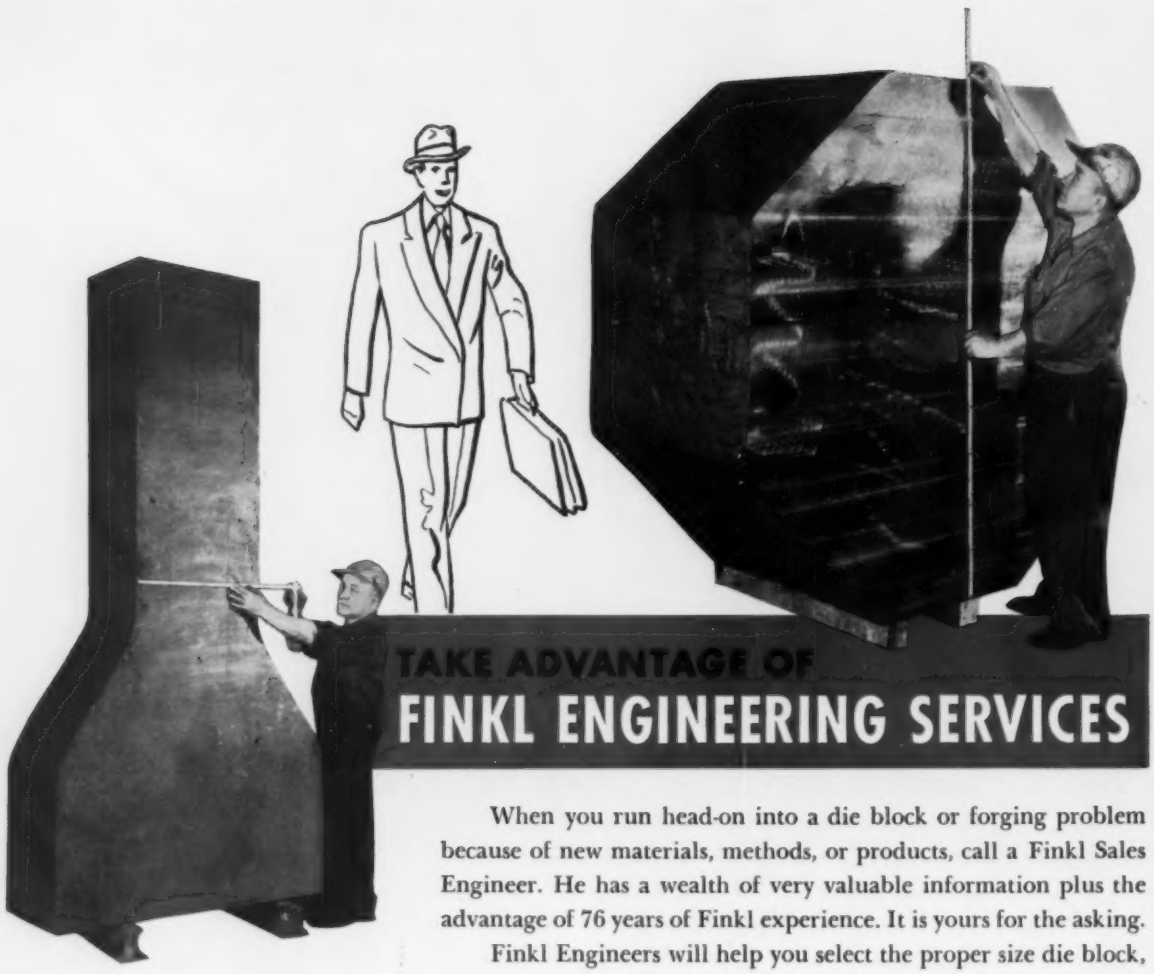
Manufacturers of:
Burke Bench Mills, U. S. No. 1 Milling Machine and the radically new U. S. Quartet



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When you run head-on into a die block or forging problem because of new materials, methods, or products, call a Finkl Sales Engineer. He has a wealth of very valuable information plus the advantage of 76 years of Finkl experience. It is yours for the asking.

Finkl Engineers will help you select the proper size die block, the right steel for the best results, the correct hardness for greater production, or give counsel on any phase of forging practice.

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When you next consider die blocks or forgings, consider Finkl for the finest. Ask for a Sales Engineer. There is no obligation.

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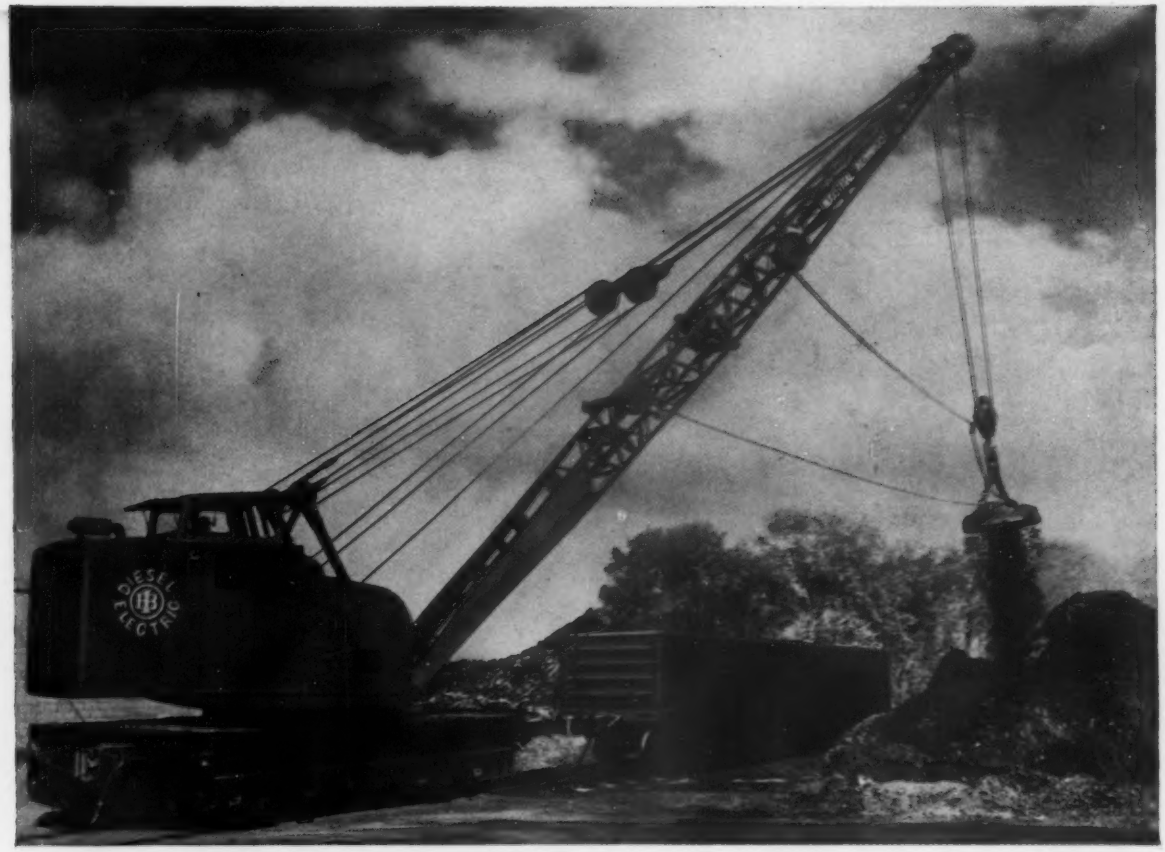

With magnet hook or bucket... BROWNHOIST speeds the job

Brownhoist Cranes are helping maintain high production schedules in mines, steel mills, factories, and scrap yards . . . in fact, wherever there are railroads throughout the world. Brownhoist Diesel-Electric Locomotive-Cranes, for all their husky size, handle easily. Their patented Monitor Type Cab and Clear-Vision Boom give a 360° view. Operating controls are within easy reach. Electric travel permits operation as a switch engine as well as a crane. Constructed to last for many years with little maintenance. Brownhoist Diesel-Electric Cranes are available in capacities from 25 to 100 tons. For complete information, consult your nearest Brownhoist representative or write us today.

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BROWNHOIST

BROWNHOIST MATERIALS HANDLING EQUIPMENT GIVES A LIFT TO AMERICAN INDUSTRY

SUBSIDIARY OF Penn-Texas

INDUSTRIAL BROWNHOIST CORPORATION
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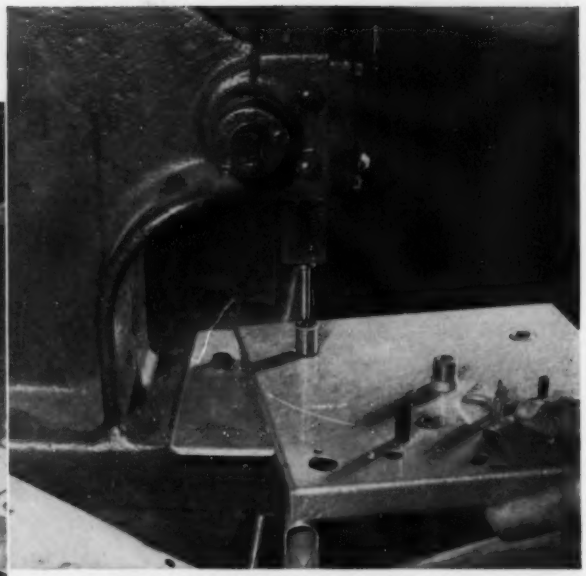
Johnson Ledaloyl self-lubricating bearings hold oil like a sponge—will never need oiling for the life of Telectro tape recorders. Here one is being slipped on to the shaft of component.



Accuracy of Ledaloyl bearings makes for snug press-fit in the base plate of Telectro recorder.

A handful of trouble-free service for Telectro—Johnson Ledaloyl bearings assure durability of recorder, yet are economical and easy to install.

For Accuracy, Durability And Economy, Telectro Industries Uses Johnson Ledaloyl Self-Lubricating Bearings

Telectro Industries Corporation of Long Island City, New York, insists that every component of their wire and tape recorders must have the quality and stamina to give trouble-free service for the life of the machine.

That is why they chose Johnson Ledaloyl bearings according to Mr. Roy Yasen, Purchasing Agent, who says: "Everything considered—accuracy, price and delivery—we find these self-lubricating bearings to be the most durable in this price range." "People who buy these recorders won't be bothered with taking them apart to oil bearings," continues Mr. Yasen, "that's why we use Johnson Ledaloyl bearings, that have the oil right in them. They last as long as the machines, without lubrication."

A Johnson distributor services Telectro, gives them immediate delivery on stock sizes, calls in a Johnson field engineer to help work out any special items.

Your local Johnson distributor has available more than 400 stock sizes in three basic types—he will be glad to work with you in developing new economy and performance in the items you manufacture. Johnson Bronze Company, 505 South Mill Street, New Castle, Pennsylvania.

Johnson Bearings

GRAPHITED
over 175 sizes

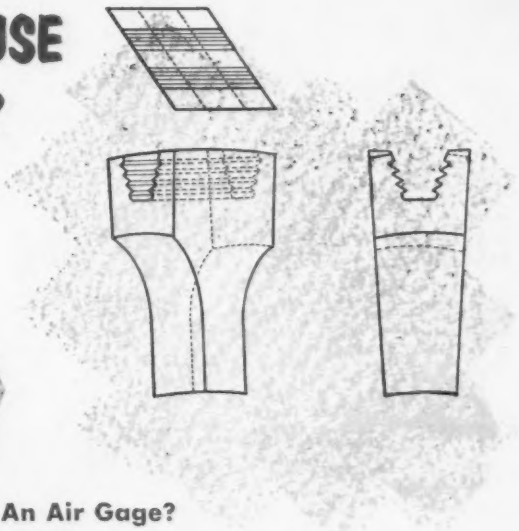
GENERAL PURPOSE
over 900 sizes

UNIVERSAL BRONZE BARS
over 400 sizes

LEDALOYL
over 400 sizes

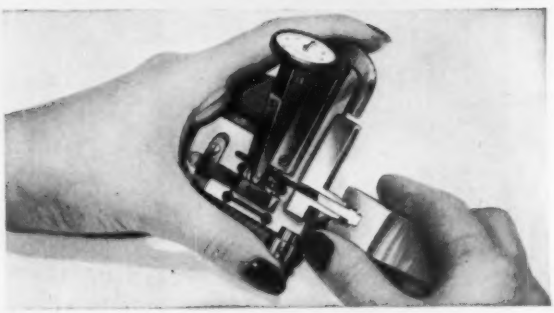
ELECTRIC MOTOR
over 350 sizes

WHICH GAGE WOULD YOU USE TO INSPECT THIS PART?



An Air Gage?

An Air Gage *can* be used to gage the serrations in this insert for turbine blades. However, had the manufacturer set up to check this part with Air Gages, he would have invested $5,500.00 more than was required.



A Dial Indicator Gage?

A dial Indicator Gage, specially modified for the work, proved the economical, right answer. **Thirty-nine** of these gages are used to assure that the dimensions of the "Christmas tree" form are held to exact size. Fast and simple, this gage fulfilled all requirements for accuracy and it cost far less because an inexpensive Dial Indicator was used instead of a much higher priced Air Gage.

Most workpieces can be gaged in a number of ways. A manufacturer of Air Gages exclusively will tell you that the gaging should be done by air and that **his** gage is the one you should buy. On the other hand, a manufacturer who makes only Dial Indicators will view the job in terms of Dial Indicators and will hope to sell you **his** gage to do the work. Usually there is **one** method which is clearly best for a given job and you cannot be sure of getting the best gage if you approach for recommendations a manufacturer who makes and sells only one kind of gage.

Since Federal makes all modern gaging systems, we can be impartial in our recommendations and supply you with whichever system best meets your needs.

Our specialized background of continuous and extended experience in gaging has taught us to analyze and solve gaging problems with certainty and to render sound service to our customers.

There is a Federal representative near you, ready to give you the facts impartially. He is unbiased and will recommend the **best** gage for your work. Write or call us today.

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Ask **FEDERAL** *First*

FOR RECOMMENDATIONS IN MODERN GAGES . . .

Dial Indicating, Air, Electric, or Electronic—for Inspecting, Measuring, Sorting, or Automation Gaging

Federal's Solution to the Cost of Gaging:
Impartial Gage Selection
Engineering Follow-Through
Everything in Gages

When Stopping D-C Motors . . . EC&M's Rectifier Plugging Control System gives FULL PROTECTION

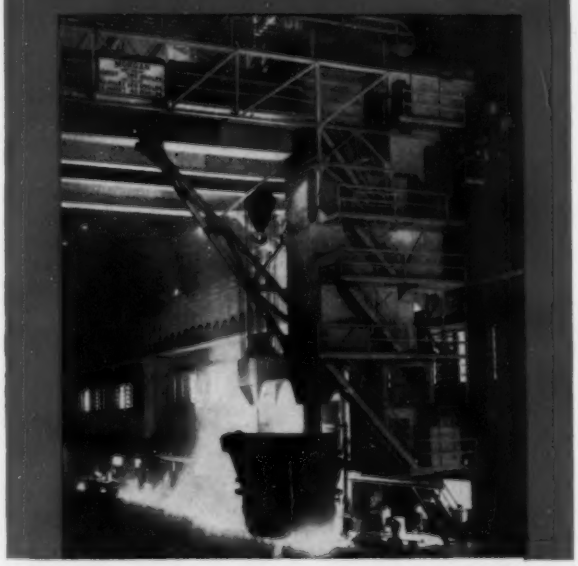
This is the simplest of plugging control systems for d-c mill and crane drives. Only a small rectifier and single-coil, mill-duty relay are required. They are connected across the motor armature for operation by counter-emf. The relay allows the Plugging Contactor to close immediately when starting from rest. When reverse-power plugging is applied to stop the motor, the rectifier permits the relay to pick up and hold open the plugging contactor. As the motor reaches stand-still, the relay drops out to close the plugging contactor and allow acceleration in the opposite direction.

The advantages of EC&M Magnetic Control are many. Ask an EC&M Engineer to explain the improved operation of d-c motors by Rectifier-Plugging.

Reasons why Motor Drives are better protected . . .

1. Positive response — relay operates directly from counter-emf of motor.
2. Reliable operation — unaffected by line voltage variation. Unaltered if taps on accelerating or plugging resistors are changed.
3. Full protection — relay picks up at any speed above 10% of F.L. motor speed. Drop-out occurs as motor reaches standstill.
4. Simplicity — a single-coil relay, a small rectifier, no electrical interlocks.
5. Reduces maintenance — relay does not require adjustment-maintenance.

View of Type FKP Relay used on EC&M D-c Magnetic Controllers.



Two-step Plugging Controllers are available for use on heavy inertia loads, such as ore bridge trolleys and ladle crane bridge motions.

THE ELECTRIC CONTROLLER & MFG. CO.

Division of Square D Company

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Absolutely Vital

TO BETTER DEEP DRAWING

If deep drawing is one of the operations in your plant, you should know about the McKay Flex-Roll Processor, a rugged, efficient machine that quickly works steel to a degree that it can be deep drawn without tearing or showing draw strain.

Hundreds of manufacturers, including every major auto producer, have found the Flex-Roll pays for itself in a few months by substantially reducing scrap and metal finishing after the draw.

Let us put you in contact with a Flex-Roll user — he'll quickly convince you that it's absolutely vital to modern day deep drawing.

The McKAY MACHINE Company
YOUNGSTOWN, OHIO

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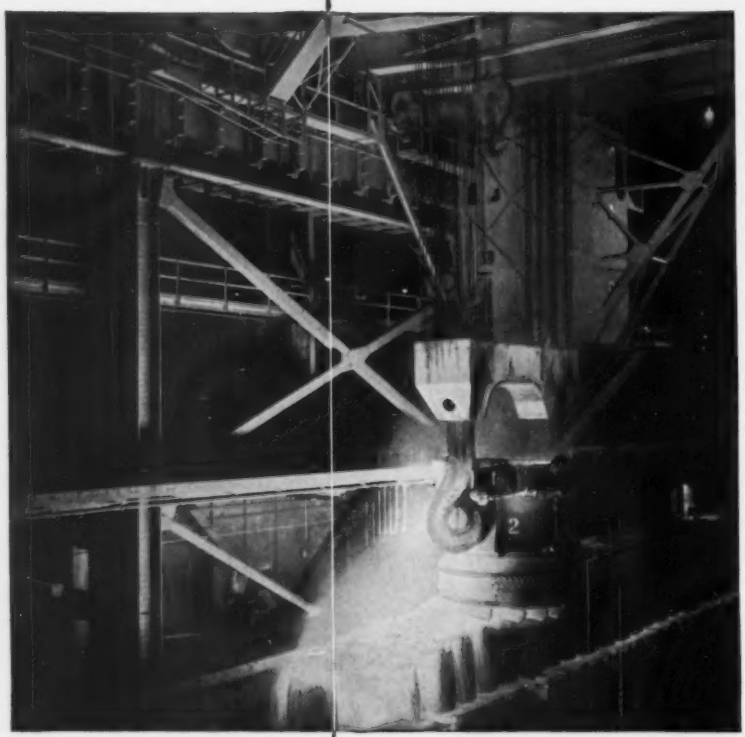
Flex-Roll PROCESSOR

Morgan cranes stop "on a dime"

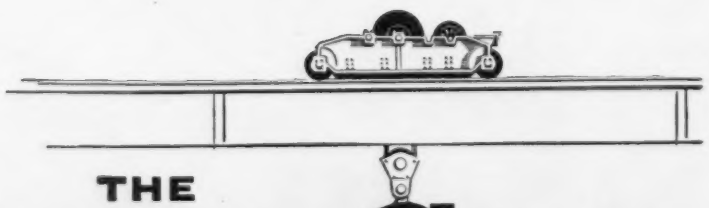
● BRAKING a Morgan crane under full load is as easy as stopping the family car.

Morgan hydraulic crane brakes provide maximum safety and pin-point accuracy in spotting heavy loads . . . another vital link in the chain of features that makes Morgan cranes best in the business.

Performance records prove that advanced design and heavy-duty construction of Morgan cranes make them less costly to operate and maintain. Let our representative show you how to save the most by buying the best . . . Morgan!



Positive action encourages operators to use the hydraulic brake rather than plug the motor.



The Morgan Engineering Company, founded in 1868, manufactures overhead electric traveling cranes, gantry cranes, charging machines, plate mills, blooming mills, structural mills, shears, saws, and auxiliary equipment.

THE
MORGAN
ENGINEERING CO. *Alliance, Ohio*

Granite City saves fuel, raises production and quality with Cities Service Heat Prover!

Nation's 14th largest steel producer uses Heat Prover on soaking pits, open hearth furnaces and on their annealing furnaces.

Granite City Steel burns enough fuel in one year to heat a five-room house for 38,000 years!

Obviously, if this fuel burns inefficiently, the loss could be staggering. But Granite City has no worries on that score. "Thanks to the portable Cities Service Heat Prover, we get better fuel efficiency, better quality, greater production than ever," they report.

"Because it provides a quick, highly accurate check of fuel-air ratio, the Heat Prover has proved invaluable in controlling combustion conditions in open hearth furnaces, soaking pits, and annealing and normalizing furnaces. In a matter of seconds it tells our engineers how efficiently the furnaces are working—whereas former tests often took hours and didn't provide as accurate a picture. Anyone in this business can probably benefit from this ingenious device."

Supplied and maintained free by Cities Service, the remarkable Heat Prover is today used and applauded by scores of major steel producers. If you'd like to learn how it could simplify your operation as it has theirs, talk with your local Cities Service Lubrication Engineer. Or write: Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

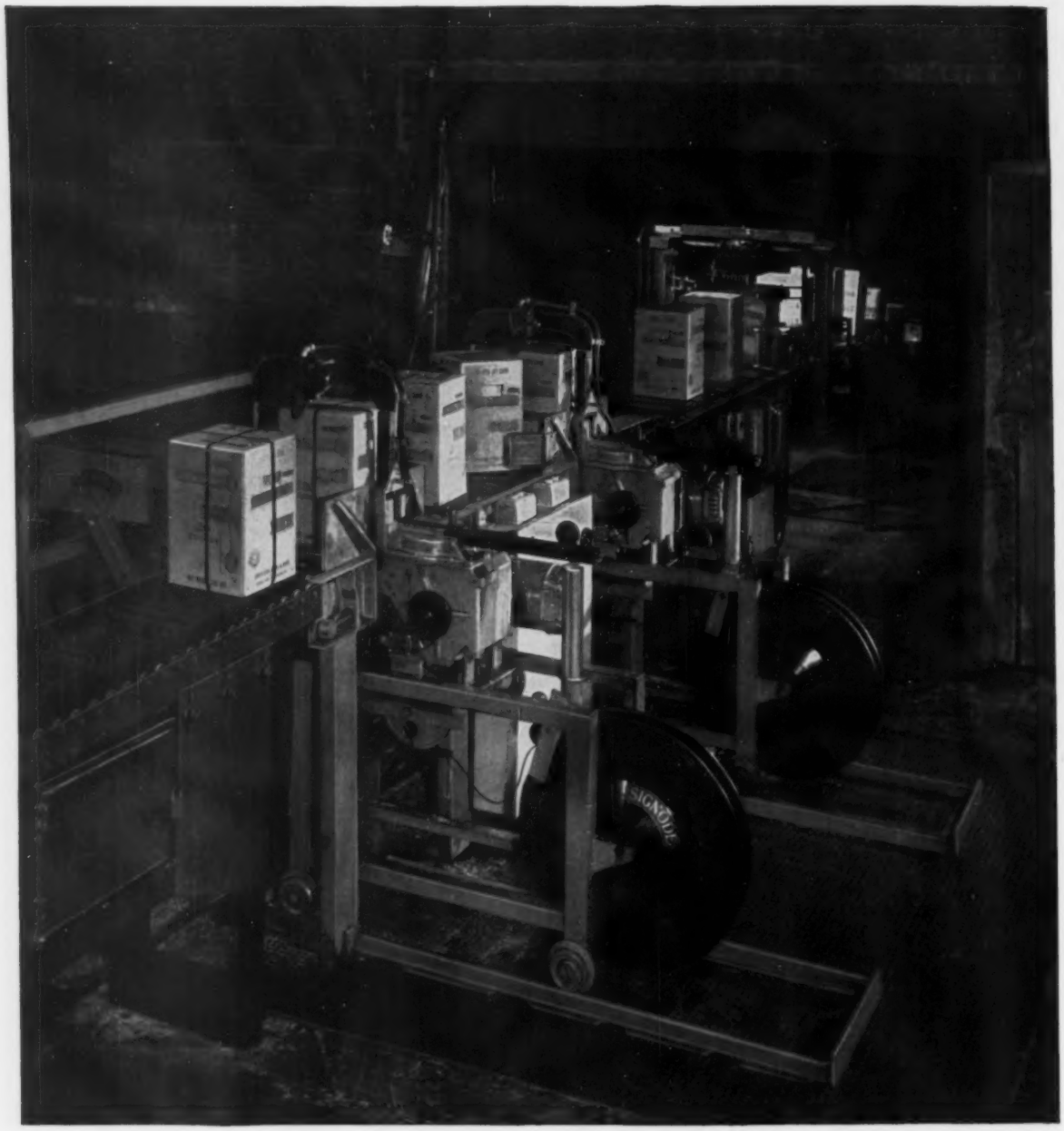
20TH CENTURY BLOWGUN—a bazooka—is readied by technicians for tapping open hearths. They are part of Granite City's 4800 skilled employees.

HEAT PROVER AT WORK at back of open hearth furnace. In minutes it provides accurate check on furnace efficiency—saves hours required by former testing.

CONTROL TOWER at blooming mill guides ingots as they pass through rollers. Granite City has capacity of 1,200,000 net tons of ingots annually.

CITIES SERVICE

QUALITY PETROLEUM PRODUCTS



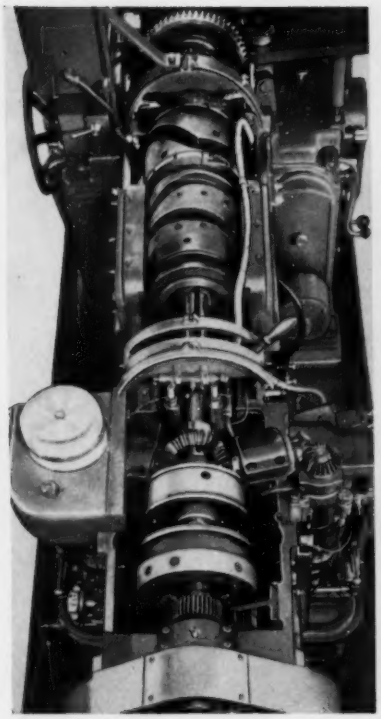
Look! No Hands!

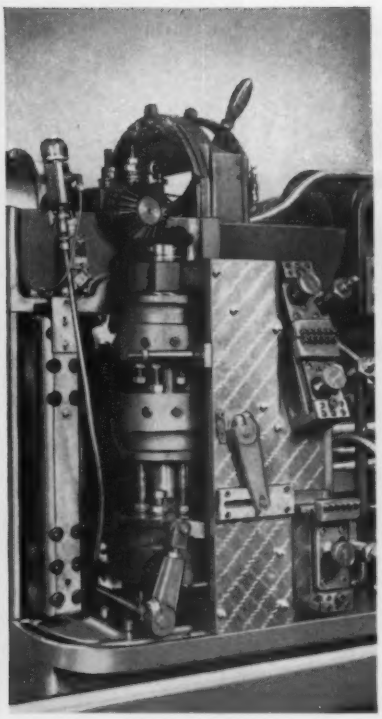
A steady stream of packages get strapped—and nobody's there. These Signode machines do it by themselves. Not all plants are ready for such automation, but these machines are ready and are running in several plants. They are one of many Signode ways to make your product cost less to handle, store, ship and receive. For high strength at low cost, you can't beat steel strapping to hold things together or in place. It will pay you to see your Signode representative. No obligation. Just write:

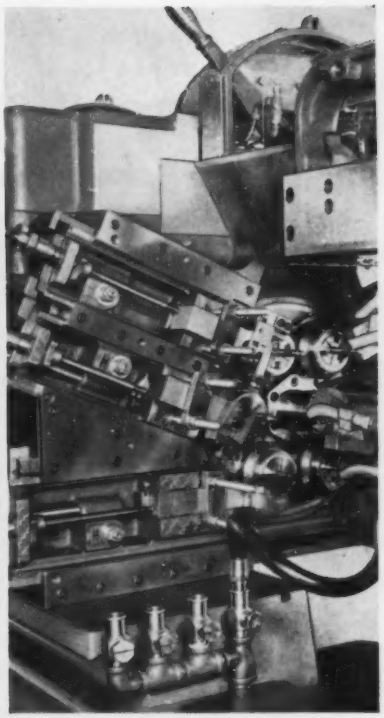
SIGNODE STEEL STRAPPING CO.

2623 N. Western Avenue, Chicago 47, Illinois

Offices Coast to Coast. Foreign Subsidiaries and Distributors World-wide.
In Canada: Canadian Steel Strapping Co., Ltd., Montreal • Toronto





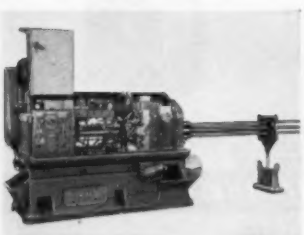


Seven Fast Changeover Models

With the prospects of improved tool materials ever decreasing the actual machining time of work on Multiple Spindle Automatics, long runs tend to become short runs. Facility that decreases the time for job changes becomes more important to low-cost production.

Conomatics are available in as many as seven fast changeover models. These are the 9/16", 1", 1⅝" Sixes and the 2⅛", 3½", 5", and 5¼" Fours.

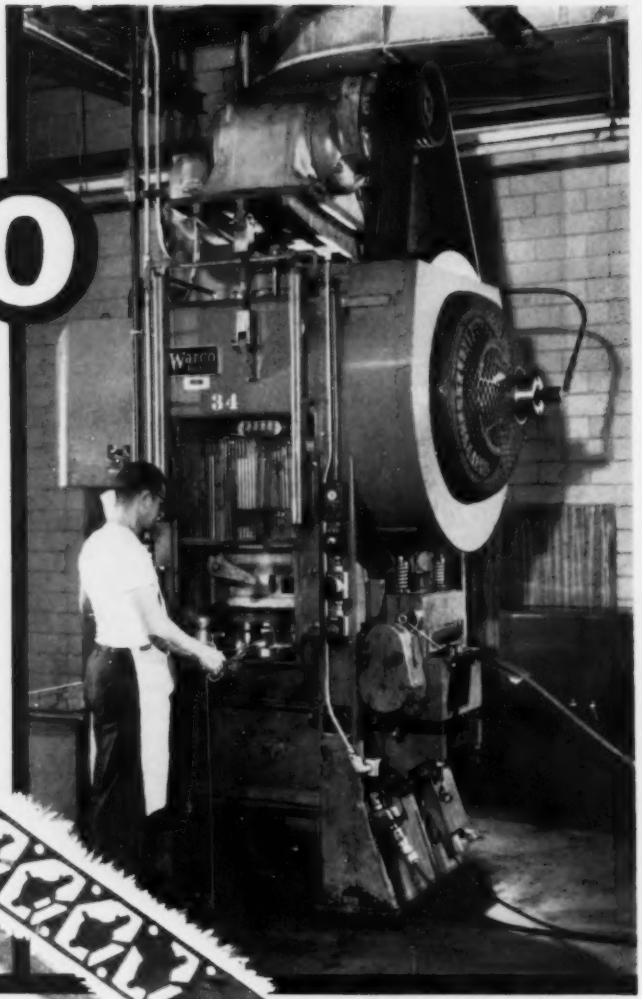
These models are equipped with dial adjustment of working stroke of all slides, without making necessary change of total stroke or positive stop settings. Write, wire, or phone for literature descriptive of these features and other facilities available to users, or prospective users.



Conomatic

CONE AUTOMATIC MACHINE COMPANY, INC., WINDSOR, VT., U. S. A.

How Warco® PRESSES help Kodak make precision cameras



Progressive die sample of pull-down claws for Kodak's Cine-Kodak Medallion 8 Camera. Warco Press produces about 6,000 per hour.

For the past eight years, Eastman Kodak Company has been using Warco Presses to stamp out many of the components used in their popular camera line. From time to time, as production demanded, Kodak has added to its Warco equipment and has found it met specifications right down the line. The 75-ton High Speed press, above, is typical of the Warco equipment. Feeding directly from coil stock through progressive dies they blank, perforate, form and emboss. The press operates at speeds up to 100 strokes per minute, turning out as many as 6,000 completed pieces every hour.

You'll find more and more Warco Presses operating in plants, like Eastman Kodak where quality and long, trouble-free service are appreciated. *The Federal Machine and Welder Co., Warren, Ohio.*

Cine-Kodak Medallion 8

Brownie Holiday Flash

Brownie Hawkeye

9872

Federal WELDERS®

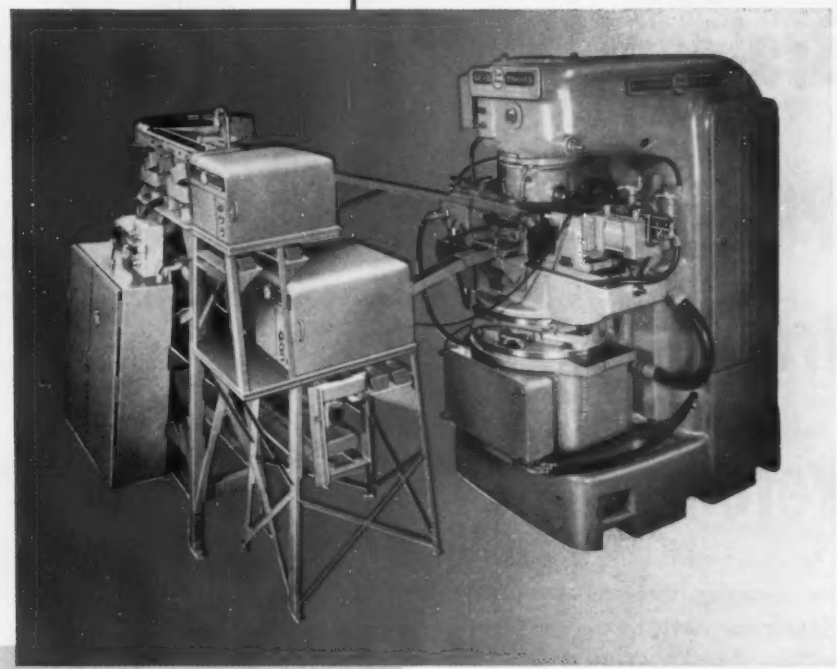
Warco PRESSES®

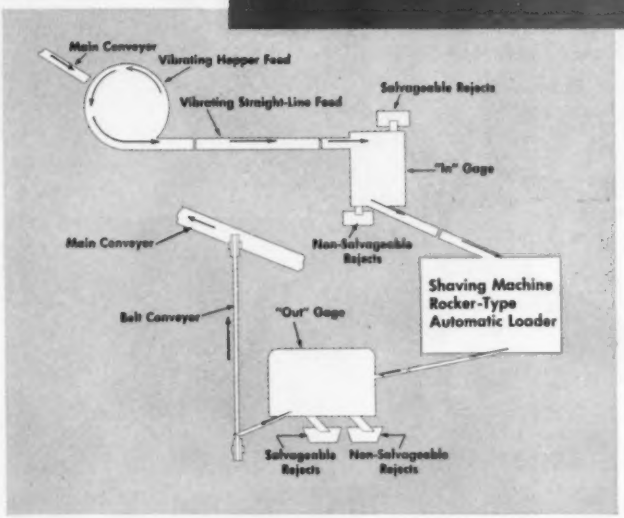
The Federal Machine and Welder Company

WARREN, OHIO

FOR MINIMUM COSTS

SHAVE GEARS AUTOMATICALLY





This is fully automatic Red Ring gear finishing.

Cut gears come in on a conveyor to the storage and feeding mechanism. This may be a vibrating hopper, overhead chute or other device.

These gears are fed into an "In Gage" which screens out undersize and greatly oversize parts, passing only those within tolerance to the Shaving Machine.

After shaving, the gears then go through the "Out Gage" where they are checked for size and helix angle—again screening out the rejects.

Whenever the percentage of rejects goes beyond a selected amount the gage shuts down the shaving machine and indicates by signal lights the nature of the difficulty.

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WORLD'S LARGEST PRODUCER OF GEAR SHAVING EQUIPMENT

7381

New Brainard air-powered strapping stretchers

MODEL PNKX

MODEL PNK

MODEL PNKX

REDUCES OPERATOR FATIGUE

New Brainard air-powered stretcher provides predetermined tension on ⅝" and ¾" tensional strap, reduces operator fatigue of stretching operations on boxes, pallets and crates. Weighs only 6 lbs., 14 oz. Simple, fast operation cuts strapping time to minimum.

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SPEEDS STRAPPING OF ROUND, IRREGULAR PACKAGES

Duck bill head is specially built for strapping operations where space is limited or awkward. Air-powered tool controls degree of tension, speeds operation. Ideal for applications using ⅝" and ¾" tensional strapping.

Find out how Brainard's new air-powered stretchers can speed your strapping operations. Send coupon today.

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STEEL DIVISION
SHARON STEEL CORPORATION

BRAINARD STEEL DIVISION
Dept. I-3, Griswold Street, Warren, Ohio

Please send free data on the following new Brainard stretchers:
☐ MODEL PNKX ☐ MODEL PNK

NAME_____
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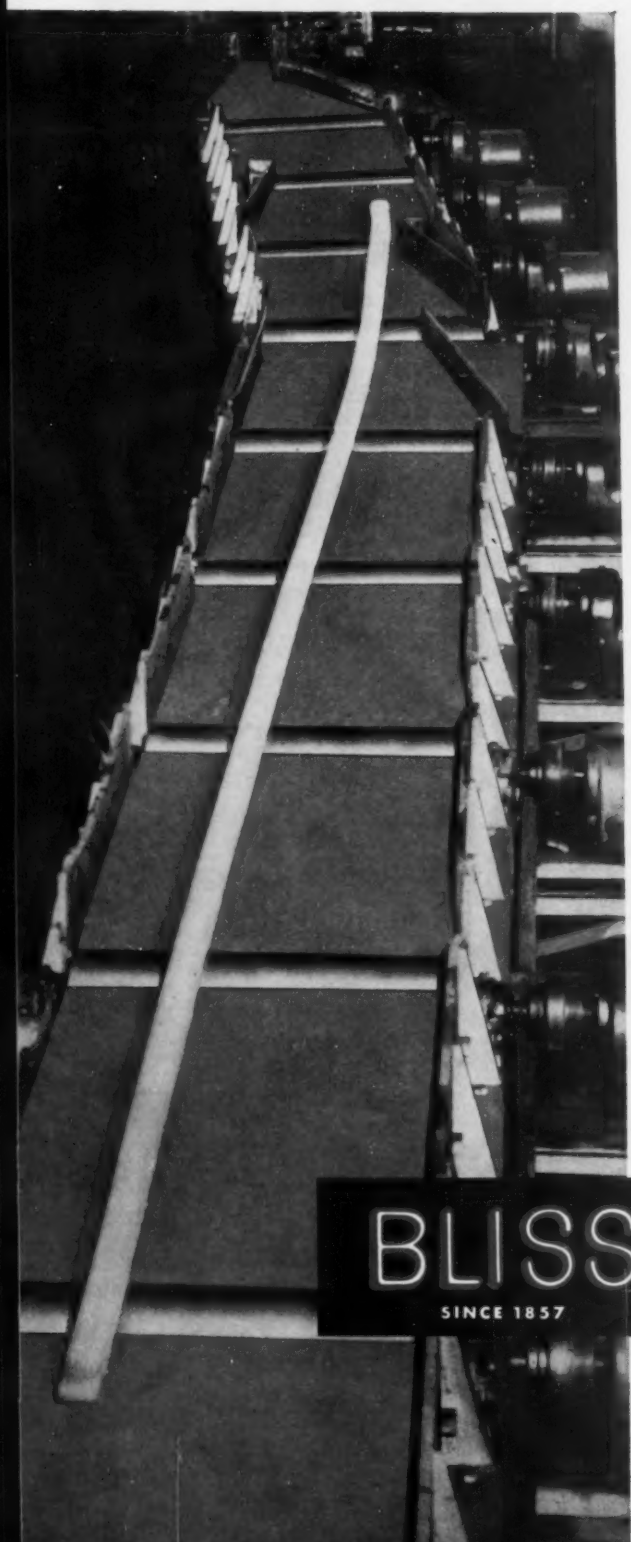
MAKERS OF QUALITY STEEL STRAPPING

Special powered-roller tables speed handling at new Merchant Bar Mill



To meet growing demands for specialized bar products, Phoenix Manufacturing Company mechanized breakdown operations at its new bar mill with three specially-designed Bliss powered-roller tables:

- a "live" table speeds billets from furnace into a three-high roughing mill,
- a tilt table shoves them back into the roughing rolls during breakdown passes, and
- a runout table carries them into the first of six finishing mills.

Designed, built and installed by Bliss, these tables help Phoenix hit top production schedules at lower costs by cutting handling time to the bone. What's more, they're designed for fast, easy maintenance—to keep up a steady, shift-after-shift flow of bar stock.

These powered-roller tables, like all Bliss rolling mill accessory equipment, are built to your specific needs, installed under the supervision of Bliss field engineers and serviced by experienced engineering personnel. Why not get more information on Bliss rolling mills and accessory equipment? Write today for your copy of Catalog 40-A—Bliss' 60-page Rolling Mill Brochure.

Bliss-designed "live" table was installed during mill construction.

E. W. BLISS COMPANY, General Office: Canton, O.
ROLLING MILL DIVISION: SALEM, OHIO
Presses, ROLLING MILLS, Special Machinery

BLISS
SINCE 1857

is more than a name ...it's a guarantee

Plants at Canton, Cleveland, Salem and Toledo, Ohio; Detroit and Hastings, Michigan; Midland and Pittsburgh, Pennsylvania; San Jose, California
E. W. Bliss (England) Ltd., Derby E. W. Bliss Co. (Paris), France

Allis-Chalmers Fork Lift Trucks...

This Allis-Chalmers Diesel Fork Lift Truck at a Chicago plant has torque converter drive, which makes it possible to easily force steel coils onto the ram — without clutch slipping and engine racing that caused difficulties with trucks used previously.

stay on the job longer...

Reports of Allis-Chalmers Fork Trucks working thousands of hours without lost time are not unusual. Such records are not surprising, either, to those who know the long-life, low maintenance features engineered into these trucks.

Their rugged construction is typified by the all-welded, automotive-type frame — strongest used. Double-reduction axle and heavy-duty, four-pinion differential lengthen service life. Precision-built mast is a welded high-strength channel. Such features as these add up to *more time on the job.*

get back to work faster

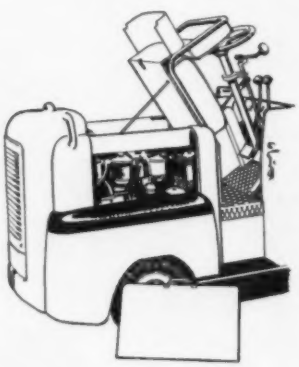
The Allis-Chalmers Fork Lift Truck is a serviceman's dream!

It takes only 22 seconds to strip for service. Lift off two side panels, tip seat forward, remove engine cowl by unscrewing two wing nuts — and everything is right there.

It takes only 22 minutes for two men to disassemble — right down to the bare frame! There are only 20 bolts and nuts to remove.

It takes only 30 minutes to change a clutch. To get at it, you simply remove the floor boards. Clutch plate is replaced without disturbing transmission or axle.

Ask your dealer to show you how Allis-Chalmers Fork Trucks make possible many bonus hours of low-cost operation.



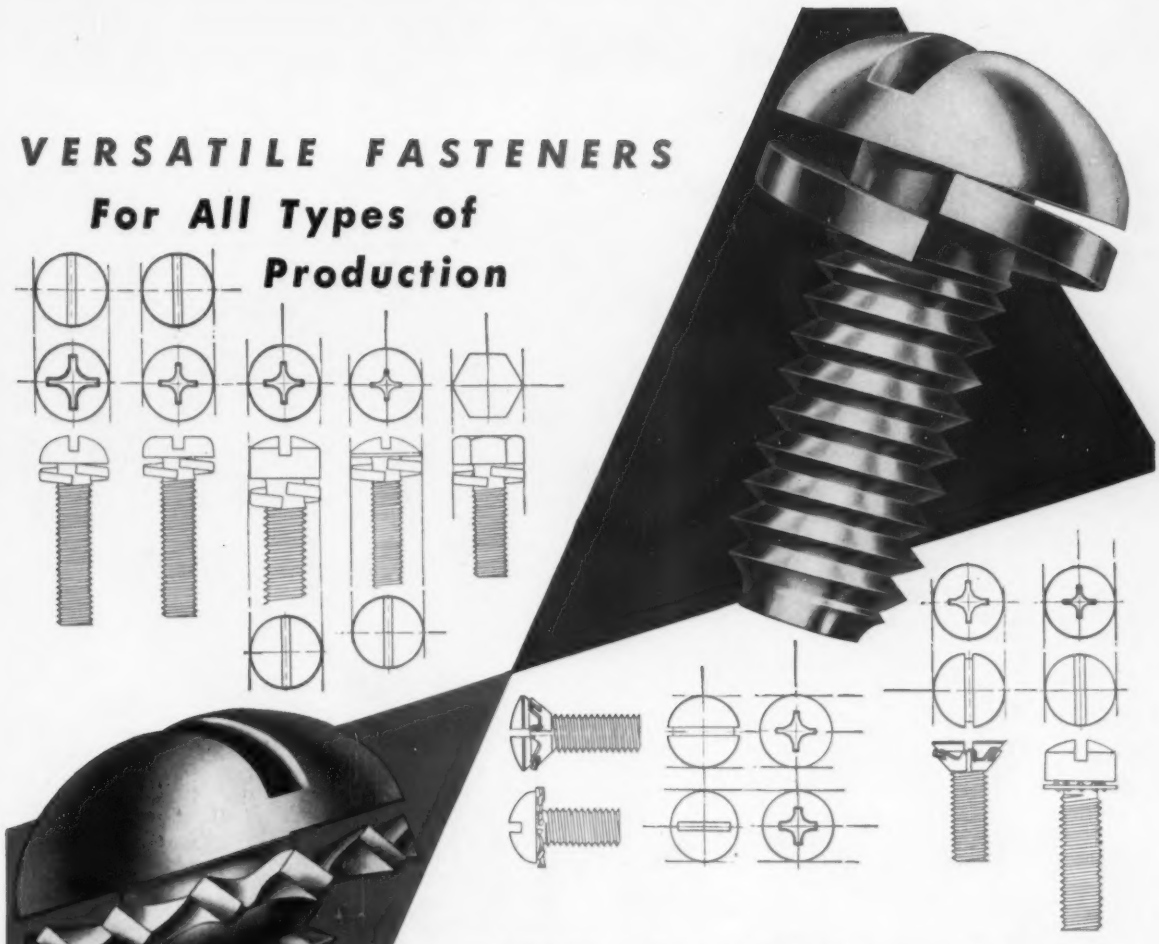
In but 22 seconds, engine, carburetor, oil filler tube, oil filter, fuel pump, battery and ignition system — all are accessible for servicing.

ALLIS-CHALMERS, BUDA DIVISION, MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

BH-6A

VERSATILE FASTENERS
For All Types of Production



EATON SPRINGTITES and SEMS

Eaton Springtites and Sems not only offer you the production advantages of pre-assembled bolts and lock washers, but give you a choice of heads best suited to your specific needs. The illustrations above show some of the varied types: round—fillister—pan—truss—hex. These head types are available with slot, Phillips and clutch recesses.

For the production man or designer, the right fastener for the job means faster assembly (can be hopper fed) and better end products. As with all Reliance fasteners, Eaton Springtites and Sems are under quality control supervision from raw material to finished product. Get the complete cost-saving story—write for Engineering Bulletin S-49 today.

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PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

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"How do you do it?"

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Brighter—Cleaner—Smoother.

Minimizes surface preparation.

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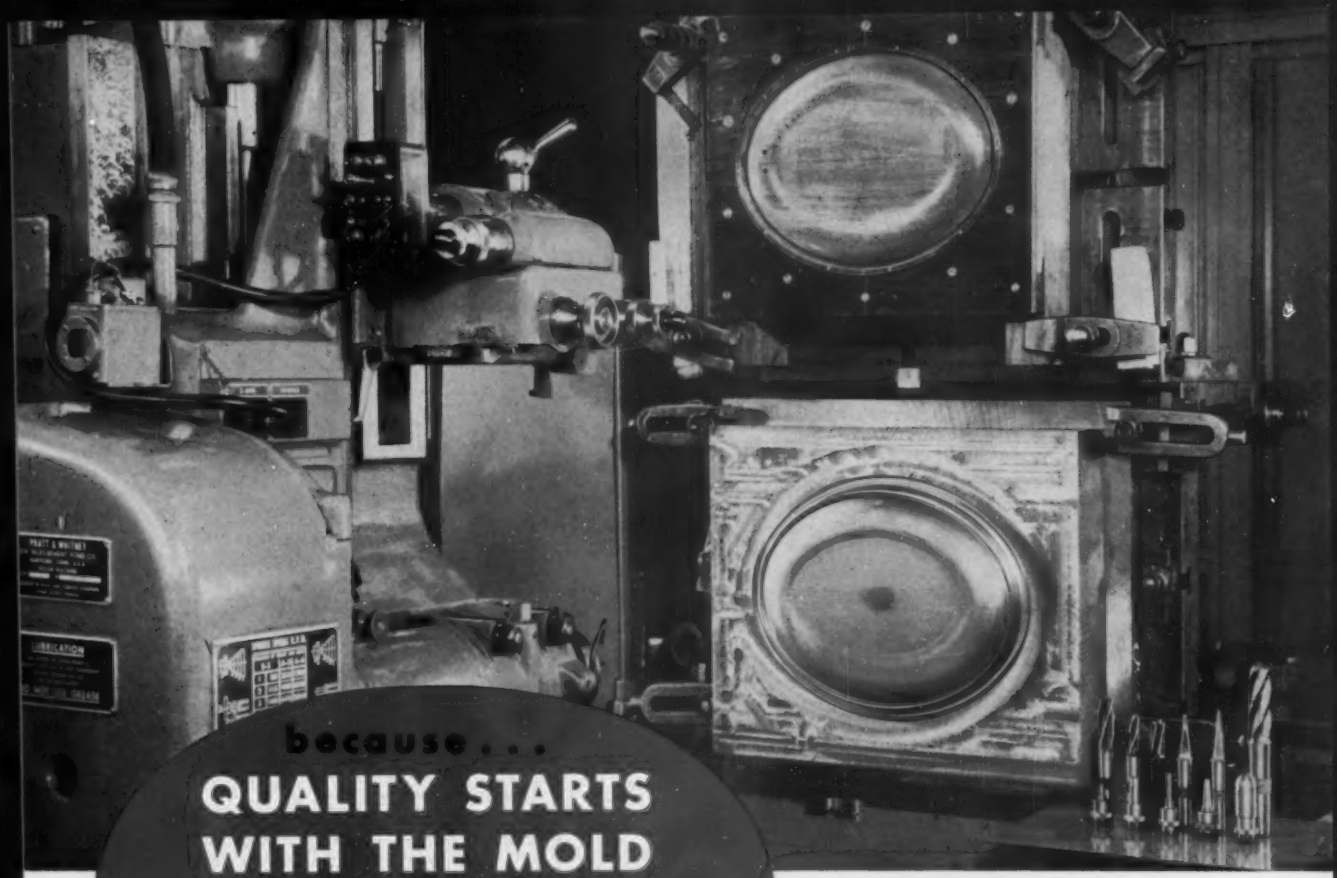

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simple or intricate, small or large, original or duplicate, single or multiple cavity.

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rugged, dependable, relatively simple. Built specifically for automatic, tracer-controlled milling. Takes on your toughest jobs without requiring major alteration. Duplicates any 3-dimensional shape quickly, accurately, automatically.

The complete line of P&W Keller Machines includes models for a very wide range of work sizes . . . there's a machine just right to handle **your** molds better. Write now on your Company letterhead for complete information. Ask for your free copy of Circular No. 490-3 describing the Type BL (for small and medium size molds), or Circular No. 565-1 describing the Type BG-21 (for larger molds).

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MACHINE TOOLS • CUTTING TOOLS • GAGES

stainless steels are thoroughbred, too

The experienced exhibitor rents extra stalls... leaves them empty... to prevent contamination of his thoroughbred pets by canine neighbors.

To develop their best qualities demands *exclusive* care. That is why Sun Ship's new Alloy Products Shop has been planned for the *exclusive* fabrication of stainless and alloy steel products. When you have selected from the many available Alloys a stainless steel best suited for your service condition, you have done only half the job. You must also provide for the best possible fabrication if you are to have full protection—"A Thoroughbred Job."

Why entrust stainless steel to be fabricated in the same shop where carbon steel products are fabricated, and subject this precious metal to contamination with iron fragments, dust, or other harmful elements? A segregated shop is your answer.

Sun Ship now operates an all-alloy shop, one especially built and equipped for fabricating stainless and alloy products as they should be—segregated from carbon steel fabrication.

We emphasize the fabrication of medium and heavy stainless, alloy and aluminum products for industry.

Try Sun Ship for stainless fabrication as it should be done.

Our Sales Engineering Department will be pleased to assist you with any of your fabrication problems.

Sun Ship also makes all types of carbon steel pressure vessels.

ALLOY PRODUCTS SHOP

OF Sun SHIPBUILDING & DRY DOCK COMPANY

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Weirzin's tightly bonded zinc coating takes the deepest draws with ease—does not crack, peel or flake under the severest fabricating operations.

Weirzin's malleable zinc coating lubricates dies without leaving a zinc deposit—reduces die maintenance—increases die life.

Weirzin, chemically treated, takes and holds paint, enamel, lacquer and lithographic ink indefinitely—eliminates underfilm corrosion.

Weirzin stops inventory losses due to rust—eliminates pickling—reduces cleaning and buffing—cuts handling before, during and after fabrication.

How to wrap up product superiority...at lower cost

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electrolytic zinc-coated sheet

No matter how extreme the stresses of fabricating operations, electrolytic zinc-coated Weirzin stands up under them. Its tightly bonded malleable coating flows so smoothly with the ductile steel base during a deep draw that Weirzin seldom needs additional coating for corrosion protection.

Here is a different kind of steel sheet. For ease of fabricating, for durability, for long-range economy, no other "similar" metal measures up to Weirzin. Weirzin is produced in a continuous strip up to 36" wide. It is available in coils or cut lengths down to ½" strip—gauges .010 to .0478. Phone or write now for the money-saving, customer-pleasing facts about Weirzin!

WEIRTON STEEL COMPANY

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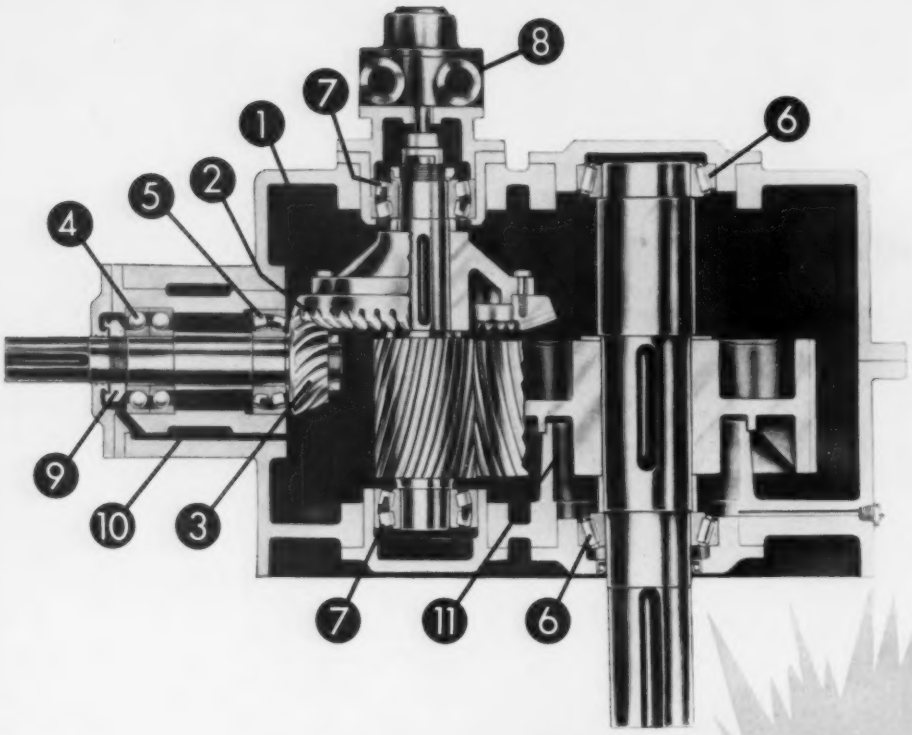

Sectional view of a Double Vertical Type Philadelphia Spiral-Bevel Speed Reduction Unit.

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. . . make us tell you the "11 points" of superiority of PHILADELPHIA SPIRAL-BEVEL REDUCERS

These units offer a compact, dependable and highly efficient means of transmitting power at right angles. They are available for Vertical (shaft-up, or shaft-down) or Horizontal Mounting; in single, double or triple reductions . . . Reduction Ratios range from 1.5 to 1 up to 238 to 1.

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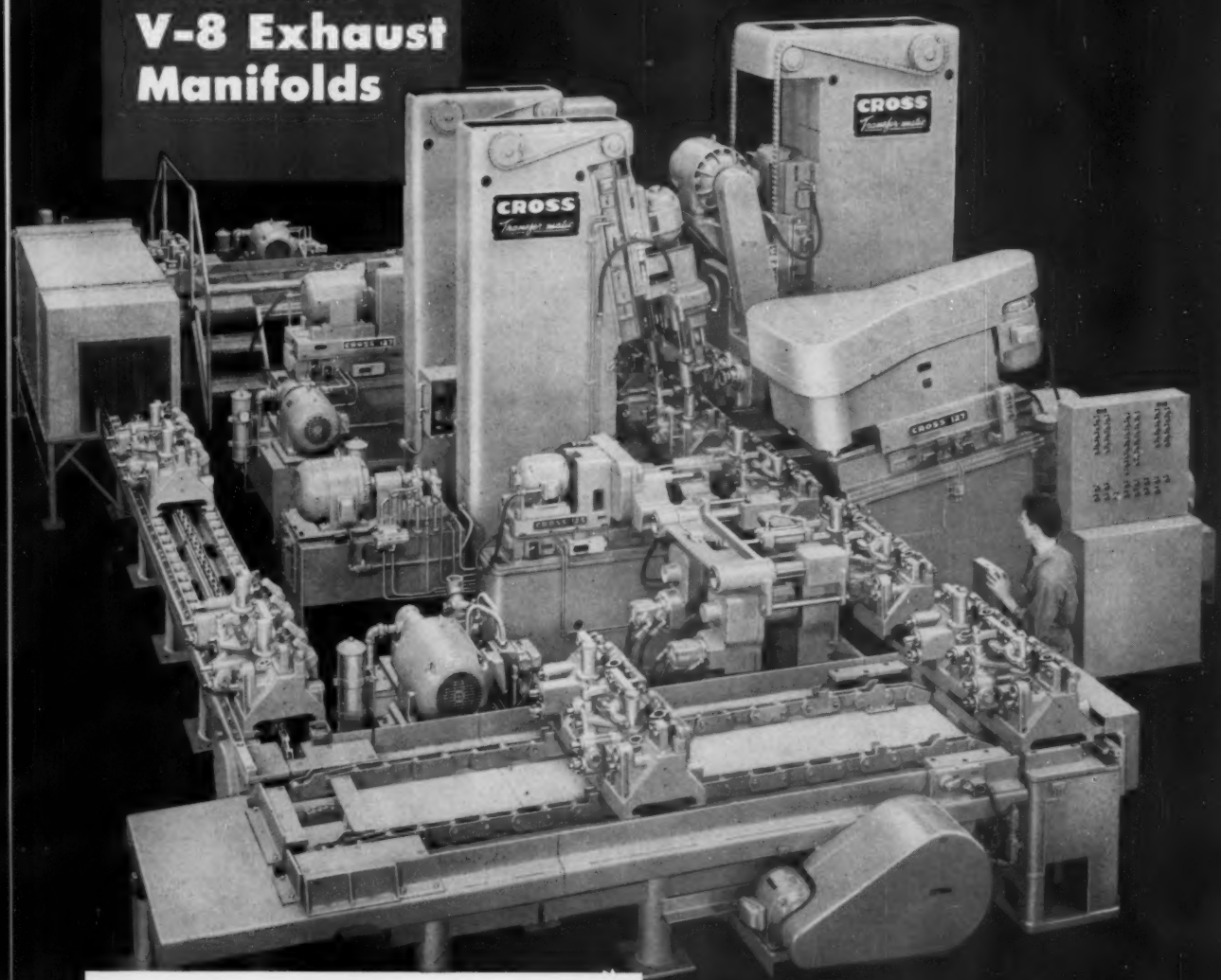
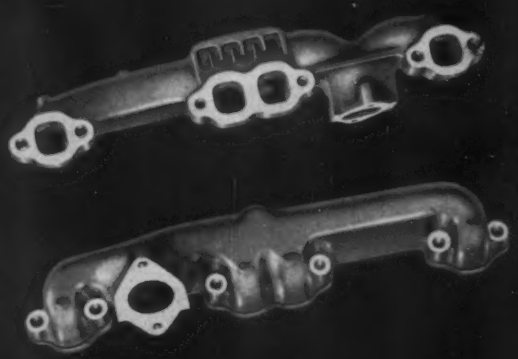
Established 1892

Completely Machines V-8 Exhaust Manifolds

Another Transfer-matic by Cross



- ★ 51 operations: 8 milling; 37 drilling, chamfering and spotfacing; and 6 tapping.
- ★ Palletized work holding fixtures for holding one right hand and one left hand part.
- ★ Automatic power wrench for operating work holding fixtures.
- ★ Automatic transfer mechanism.
- ★ All parts in Cross machines—even tooling details—are made to interchangeable tolerances for fast, easy maintenance.
- ★ Other features: Construction to JIC standards; hardened and ground ways; hydraulic feed and rapid traverse for milling, drilling and boring; individual lead screw feed for tapping.



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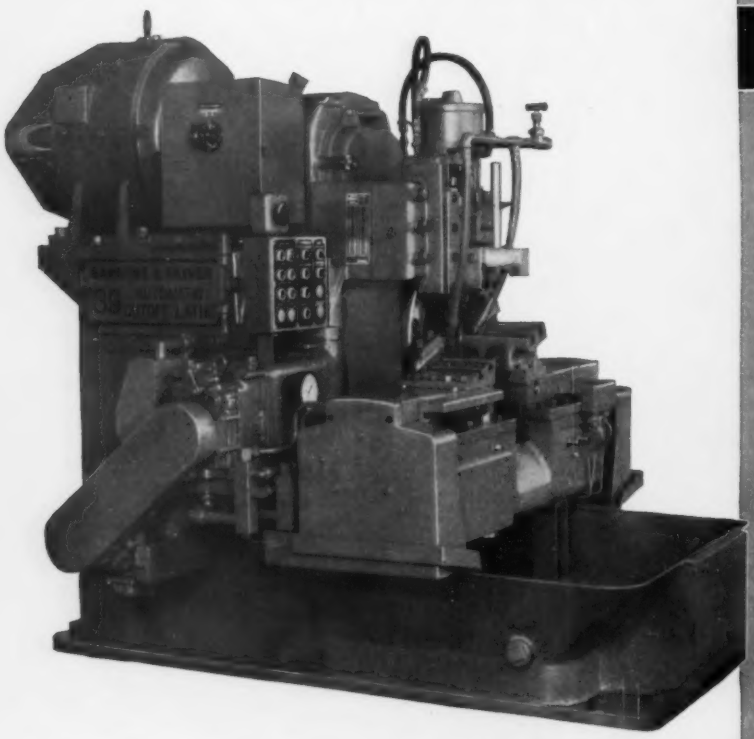
√ SEMI-AUTOMATIC FOR CROPPING WORK



ADDITIONAL SIZES OF BARDONS & OLIVER CUTTING-OFF LATHES			
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No. 33 — " "	½″	dia. to 3″	dia.
No. 34 — " "	¾″	dia. to 4″	dia.
No. 35 — " "	1″	dia. to 5-⅝″	dia.
No. 36 — " "	1½″	dia. to 6⅝″	dia.
No. 38 — " "	2⅜″	dia. to 8⅝″	dia.
No. 39 — " "	2⅜″	dia. to 9⅝″	dia.
No. 312 — " "	4½″	dia. to 12¾″	dia.
No. 316 — " "	6⅝″	dia. to 16″	dia.

We also manufacture a complete line of Turret Lathes

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- More rugged, dependable double tool slides
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Optional Extras

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- Speed accelerating device for cutting off solid bars
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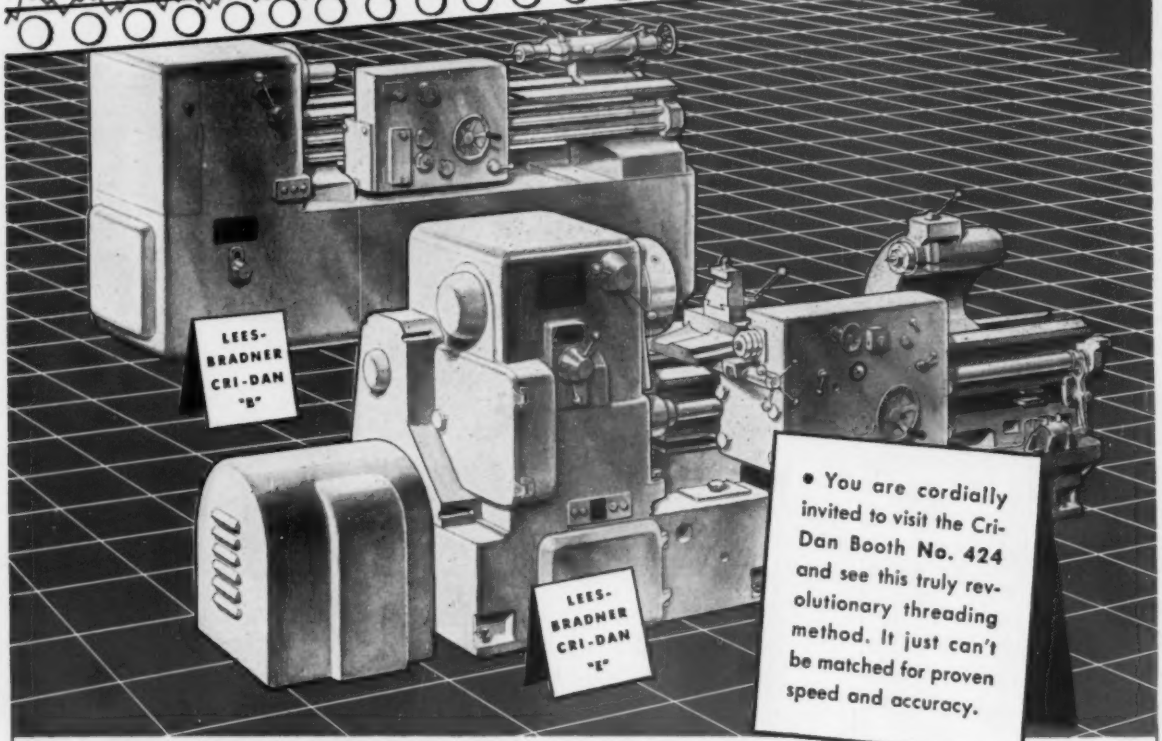

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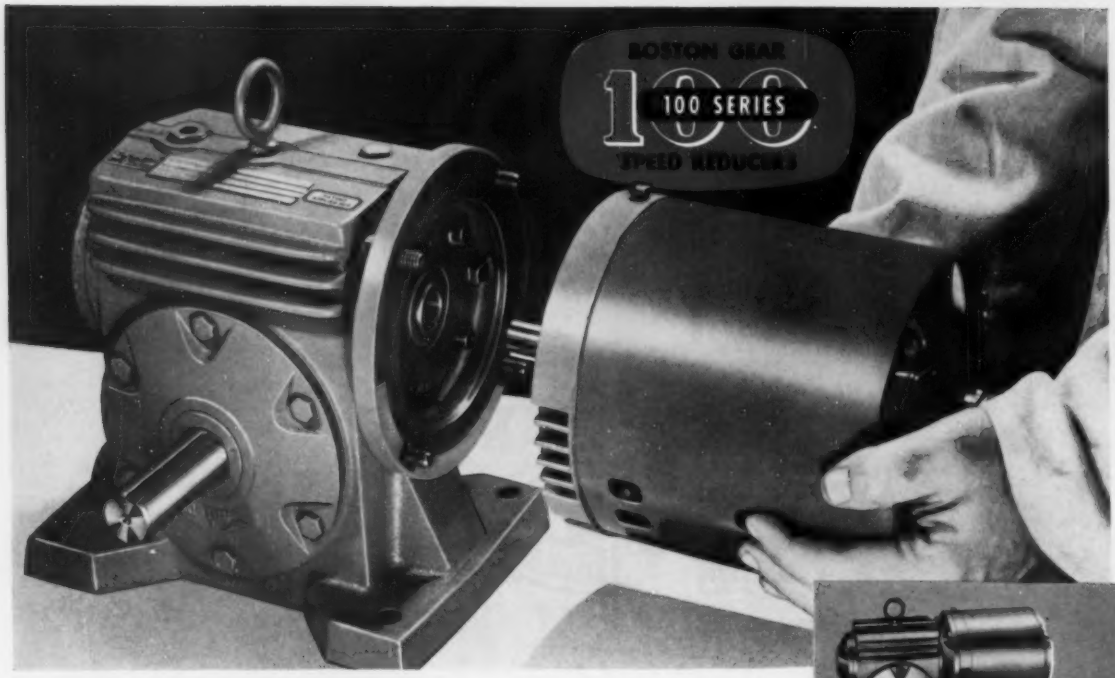


No downtime for motor repairs!

New COST-SAVING "COMBINATION"

permits motor change in minutes . . . continued operation with spare

The new 100 SERIES RATIOMOTOR combines a gear reduction unit and an easily detachable, standard end-mounted motor.

MOTOR CAN BE REMOVED and replaced in a few minutes, without disturbing the gear reduction unit. Saves maintenance time, preserves alignment, permits continued operation with spare motor.

ORIGINAL MOTOR CAN BE CHANGED When conditions require change to a motor of special characteristics (totally enclosed, explosion-proof, etc.) it can easily be attached in place of the original motor.

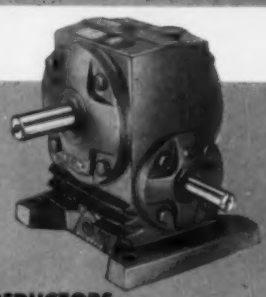
ANY MODEL NEEDED – FROM STOCK The 100 SERIES includes 1064 different *standardized stock* units for an unlimited range of applications . . . Reductors, for mechanical drives, as well as Ratiomotors and Flanged Reductors. All ratings are *certified* to be actual torque delivered, by Independent Laboratory tests.

A BOSTON GEAR FIELD ENGINEER will help you simplify planning, and put your product ahead in design. Your Boston Gear Distributor will arrange a call, or write: Boston Gear Works, 72 Hayward St., Quincy 71, Mass.

RATIOMOTORS
The complete power package, with motor.

SOLD WITH OR WITHOUT MOTOR

FLANGED REDUCTORS
The Ratiomotor gear unit, supplied without motor. You buy and attach any motor you choose.



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For mechanical drives, new 100 SERIES design saves space and weight. Housings are finned for improved cooling. Fan-cooling optional on larger sizes.

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PATENTS PENDING

55-BG-R-17A

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A. M. Castle & Co.
--gives you
immediate delivery
on EVERYTHING in steel
1--TREMENDOUS STOCK--To meet the daily requirements of thousands of large and small customers all over the country--A.M. CASTLE & CO. has one of the largest and most complete stocks of steel in America. And, every one of the thousands of items is ready for--immediate delivery.
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3--QUICK PROCESSING--For 65 years Castle has had an enviable reputation for fast, friendly, intelligent service. And, no wonder--97.6% of the orders received today are made ready over night for shipment tomorrow. Some orders received early enough can be delivered the same day. And in emergencies--delivery can be made in only a few hours.
Like thousands of others, you'll save time, effort, and paper work by ordering from A. M. CASTLE & CO.--the distributor who can give you immediate delivery on EVERYTHING in steel.
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This nickel alloy casting by the Curtiss-Wright Metals Processing Division costs 40% less than identical previous castings. The saving, however, is almost a sidelight to the fact that specialized know-how can discover routes to quality that are often far shorter as well as less expensive.

High Standards, Lower Cost

In this case the answer to meeting high standards and lower cost was ceramic mold instead of investment casting. This method in experienced hands retained the close tolerances required . . . produced castings faster, and with gratifying economy.

Metals Processing Division metallurgical specialists can find answers for you, whether in ceramic, shell, centrifugal or other techniques . . . standard or special. You will profit by long-proven engineering ability and unmatched facilities in production and testing. When requirements are critical, when precision must be combined with resistance to heat, stress, wear and corrosion, it's time to call on Curtiss-Wright—a primary source for castings, forgings and extrusions.

METALS PROCESSING DIVISION
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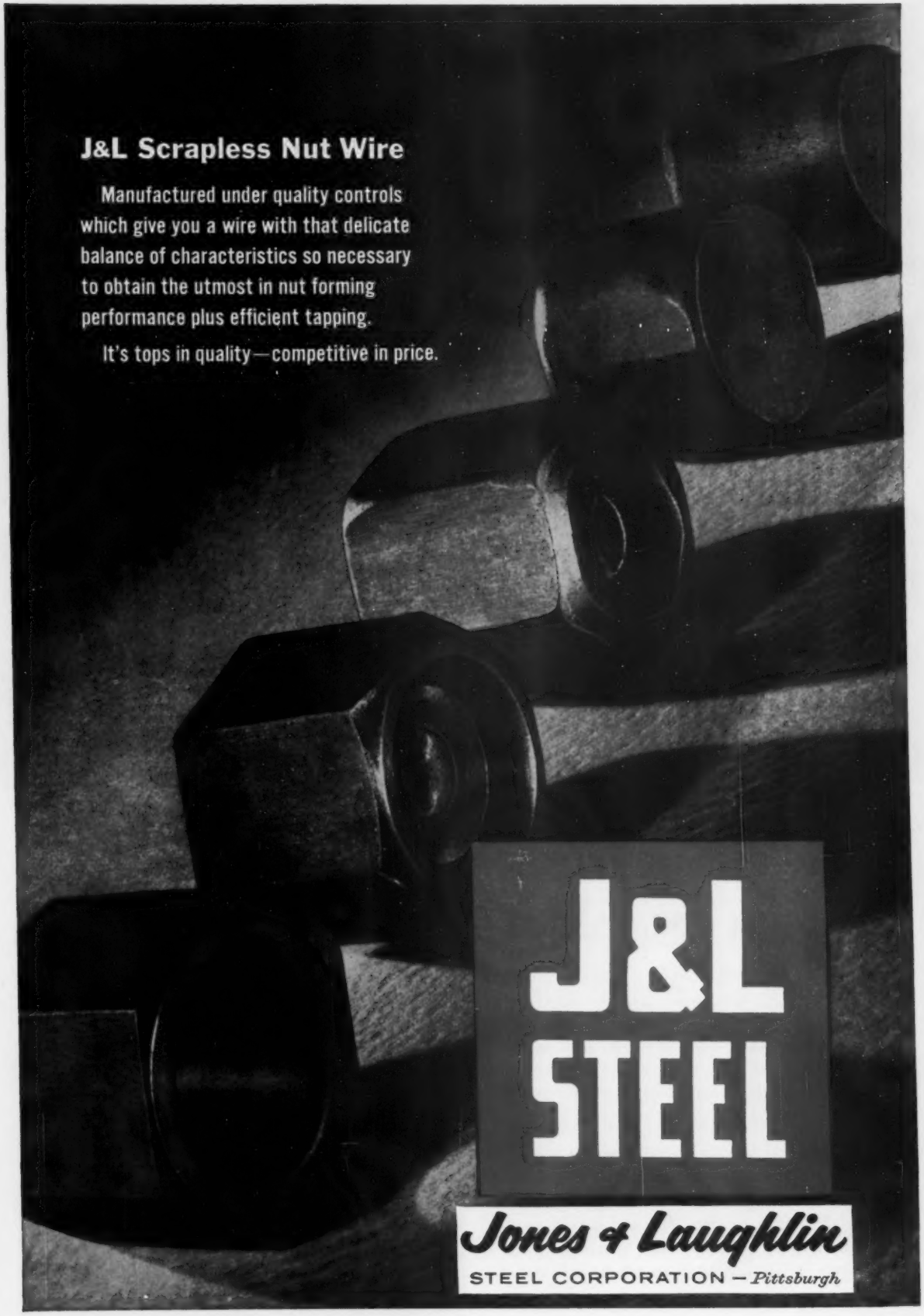
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Manufactured under quality controls which give you a wire with that delicate balance of characteristics so necessary to obtain the utmost in nut forming performance plus efficient tapping.
It's tops in quality—competitive in price.
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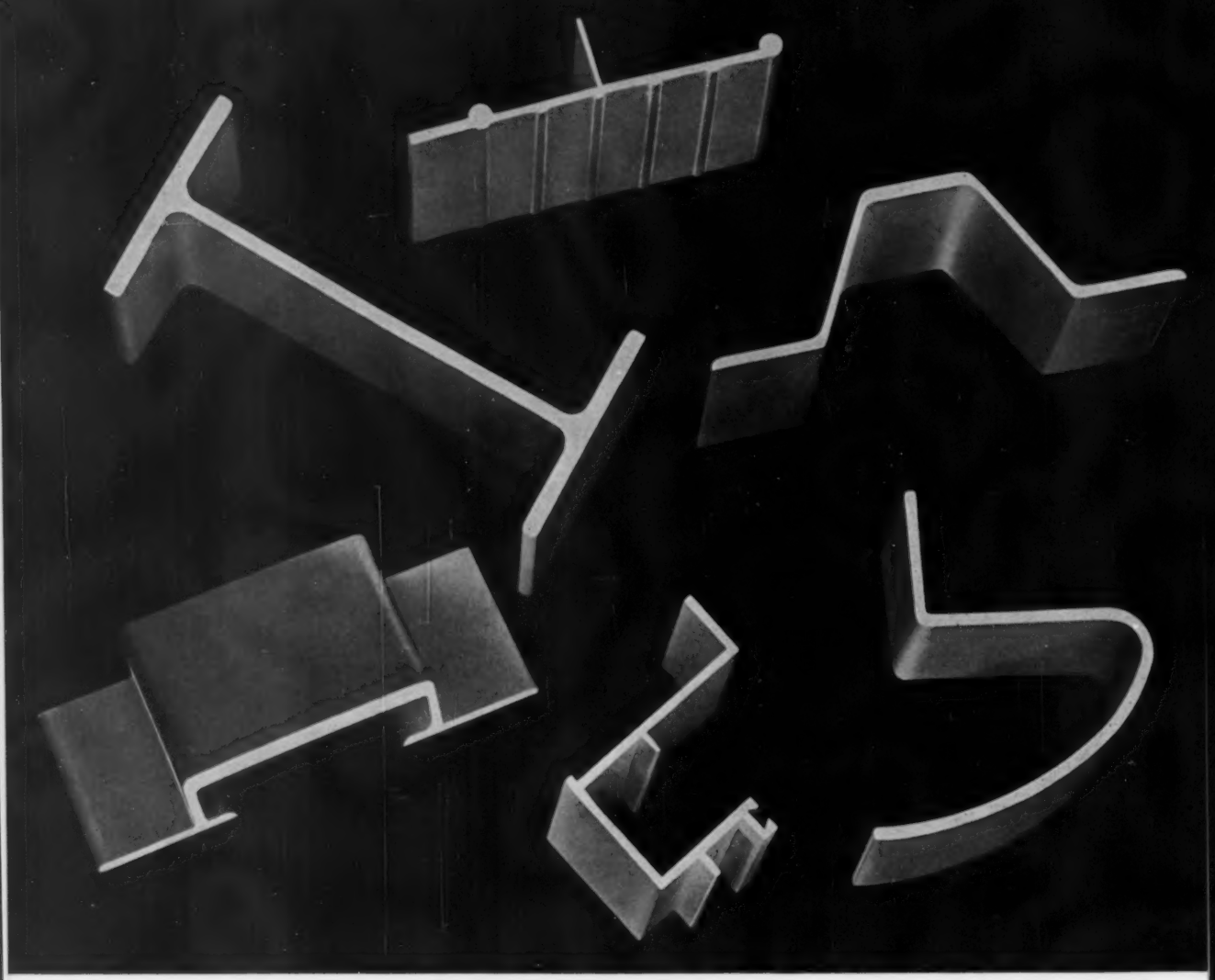

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You get service like this, when your aluminum extrusions are made at Flynn. Skilled engineers and metallurgists put their years of experience at your command. Rigid inspection and step by step control are the rule at Flynn to make your extrusions high in quality, at lowest possible cost.

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NEWSFRONT

Computer Gets Its Hand In Manufacturing

First practical pilot run of computer-controlled manufacturing took place recently. News of this advance to complete automation is being hushed, however, in anticipation of an immediate reaction on the price structure of products within the industry. Without punched cards, tape or human control, the system rapidly juggles 16 continuously changing production variables. Result: Operation is now so closely controlled that the end product falls well within acceptable standards.

Bigger Coils Would Help

Appliance manufacturers are urging producers of narrow cold-rolled strip to turn out larger coils. If coils are end-welded into 30,000-lb coils instead of 15,000-lb size from one producer, stamping press downtime can be cut almost in half.

New Process Re-Uses Heat

Improved techniques for handling molten slags have stimulated interest among large furnace companies in recovering tremendous quantities of heat previously wasted. The new process facilitates suspension of molten slag in a fluidized bed where its heat may be rapidly and efficiently extracted in usable form. Potentially, output of steam from slag of a single blast furnace may exceed that of a large commercial power plant.

There's Profit In Chips

Cast iron chip scrap is now being profitably transformed into highly dense briquettes on a mass production basis. Thanks to a special 400-ton press, the new briquettes—a direct substitute for pig iron—could help to brighten the ferrous scrap picture.

Average Machine-Tool Age Climbing

Average age of machine tools in U. S. plants keeps going up. According to builders, this refutes the idea that machine tools are bought, not sold. One builder claims little trouble in selling to shop people. The tough selling job is in convincing management they need new equipment. The aim is a simplified replacement formula that won't scare or confuse those who have to say 'yes' to a purchase.

Keep Plugging For Thinner Stainless

A leading fabricator of thin-gage stainless steel is up to its ears in development work to adapt stainless to aircraft skin applications. Work is an outgrowth of friction-generated heat problem created by high speeds of supersonic aircraft. Stainless will withstand higher temperatures, but compared with aluminum, weight is a drawback. Trick is to hold gage to a minimum without sacrificing strength.

Service For American Industry

Specialists are scanning through more than a thousand European technical and industrial publications, then translating and digesting important articles for U. S. industry. The 140-page monthly digest will be distributed by the Organization of European Economic Cooperation. It'll contain information on metalworking, ceramics, protective coatings, fuel, power, lubricants, materials handling, structural engineering and many others. Cost: $24 per year.

Resistance Welder Sales Boom

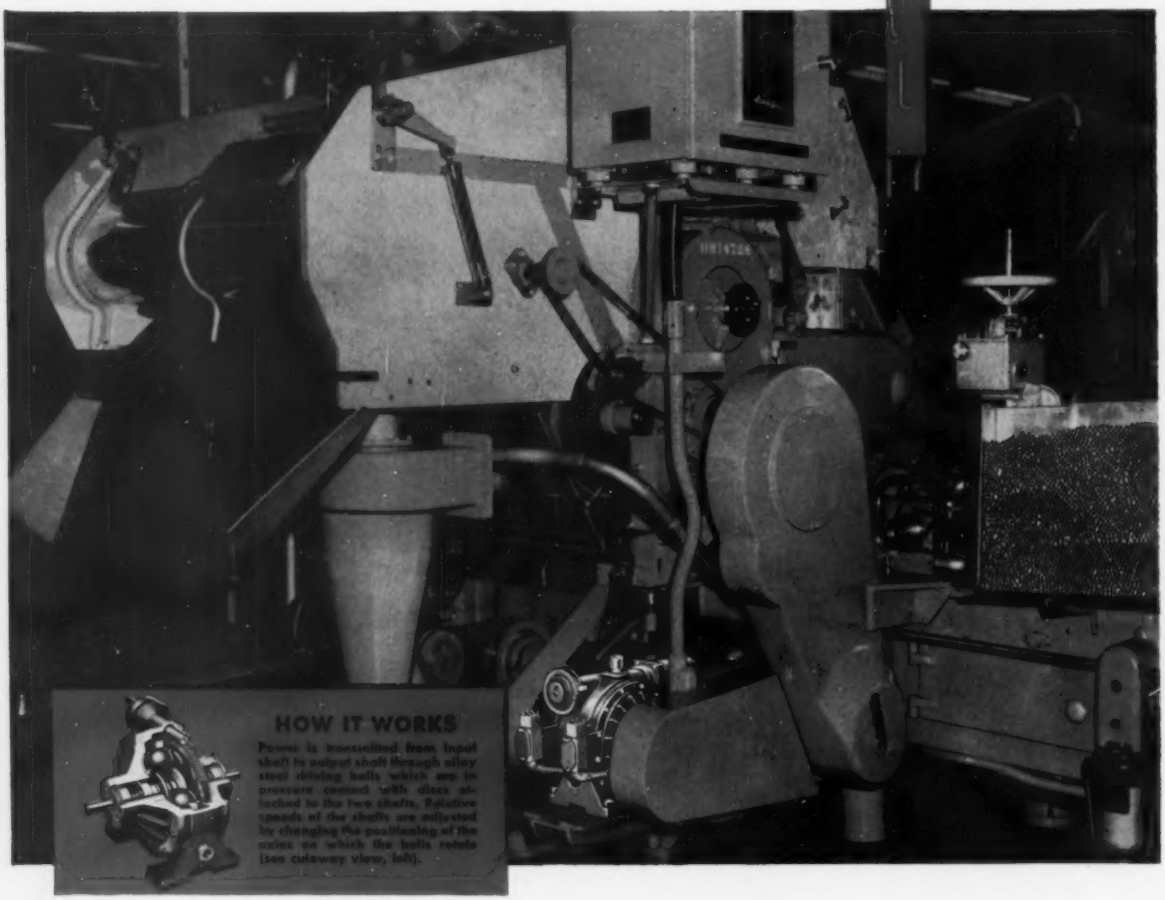
Sales of resistance welding equipment hit a new monthly high in January, exceeding last year's figure by 186 pct. In releasing the statistics, the RWMA reports a backlog of orders on hand at about $15 million. Net orders for January amounted to more than $5.5 million. Shipments increased 26 pct.

Apply Brakes On Automation

Estimates on how far automotive operations will eventually be automated will be just that —estimates. Fact is that Detroit tool engineers are showing a noticeable tendency to slow down on automation for some types of operations. In other areas, however—loading and unloading, and assembly—automation seems to be highly favored.

AccuRay electronic brain gets muscle power from Cleveland Speed Variator

The electronic control mechanism of this cigarette machine, known as the AccuRay cigarette gage controller, built by Industrial Nucleonics Corp., Columbus, Ohio, employs Cleveland Speed Variator size 4K4, driven at 1200 rpm input.



HOW IT WORKS

Power is transmitted from input shaft to output shaft through alloy steel driving balls which are in pressure contact with discs attached to the two shafts. Relative speeds of the shafts are adjusted by changing the positioning of the axles on which the balls rotate (see cutaway view, left).

NATIONALLY famous for checking and controlling the making of Chesterfield cigarettes, AccuRay depends on a Cleveland Speed Variator for the delicate job of adjusting the tobacco feed rate in response to impulses from the gaging mechanism.

Being infinitely variable, the Cleveland Speed Variator gives stepless speeds over a full 9:1 range—from ⅓ to 3 times input speed. Output speed on this application is adjusted automatically by a regulating motor mounted on the Variator—but could be regulated manually or by remote controls of other types.

Available in eighteen standard types and sizes, the Cleveland Speed Variator offers these major advantages: 1. An extremely compact unit with input and output shafts in line and rotating in the same direction; 2. Almost any input speed up to 1800 rpm can be used—either clockwise or counterclockwise rotation; 3. Rated for constant horsepower output over a 9:1 range, or for constant output torque with a 6:1 range; 4. Infinitely variable over the entire speed range; 5. Rapid response to speed change, precise adjustment, and accurate maintenance of speed settings; 6. Long life and minimum maintenance due to absence of belts or complicated linkages; 7. Ample bearing support for overhung pulleys on either input or output shafts.

Write for Bulletin K-200 for detailed description with photographs, sectional drawings, rating tables and specifications.

THE CLEVELAND WORM AND GEAR COMPANY

Speed Variator Division, 3282 East 80th Street, Cleveland 4, Ohio

Sales Representatives in all major industrial markets • In Canada—Peacock Brothers Limited

ODDS: 50-50 For Steel Labor Peace

Ike's decision to run swings pendulum toward peaceful settlement in steel . . . But bargaining will be tough . . . McDonald will throw the book at industry bargainers . . . Neither side wants war—*By Tom Campbell.*

◆ TWO WEEKS AGO the odds on a steel strike were 6 to 4. Now that Ike is to run for president again the betting is 50-50 for a peaceful settlement.

But the odds are 100 to 1 that management will have a tough time in this year's steel wage negotiations. There will be plenty of rough—and tumble.

Much of the "trouble" will not necessarily come from across the bargaining table. It may be a case of the steel union out Madison Avenue-ing the steel companies.

The kickoff in steel labor's bid for public support was "operation soundoff" at Chicago this week. The democratic flavor of the rank and file voicing their ideas in a big free-for-all with the press in attendance was the beginning of a campaign for one of the biggest wage package demands in recent steel labor history.

This year steel contracts will be rewritten. Both sides have been doing plenty of thinking. Now the attempt will be made to test each other out while at the same time lining up general public support.

Barrel Routine

The sad part of it for steel firms is that once again they will be over the barrel as they have been many times in the past. It is almost a pattern. This year Dave McDonald, steelworker chief, will throw the book at his collective bargaining conferees across the table.

The reason why it is only an even chance that the steel contract will be signed without a strike is because of the last-minute unpredictability of both sides. Mr. McDonald, in the home stretch, may make his demands so arbitrary that they won't be met.

Among Top Dogs

Steel management may also get jittery in the final stages — and why not with the bill that will be presented? With the President running again the job may be harder for steel management. It doesn't want to see Ike compromised in any way. So it will go slow in rocking the boat. But it won't "stand for anything."

There have been some stories to the effect that Dave McDonald isn't in on the high level decisions of the AFL-CIO executive councils. Maybe that appeared to be the case some time ago. But it isn't that way now. Dave was very cozy with the top dogs in labor's inner sanctum at Florida recently.

There are indications that Mr. McDonald has boned up on the training he received at Carnegie Tech's drama school some years ago. He has matured rapidly since he took over the steelworkers presidency after Philip Murray died. His speeches give the impression that he has adopted—in public at least—the statesman approach to labor matters; especially the steel talks.

Good Support

It is true too that Dave McDonald has as a supporter the competent (according to management lawyers) labor counsel, Arthur Goldberg. Not in the limelight also are the many AFL collective bargaining experts who are now available to Dave if he wants them. And Mr. McDonald is going to use everyone and everything

What's the Steel Wage Hassle Outlook?

What Do The Steelworkers Want?

A 52 week supplemental unemployment plan (SUB).

A big wage increase

A union shop

Premium time for Saturday and Sunday as such

What Would They Settle For?

An SUB similar to the Ford Plan but with 52 weeks; or at least better than Ford.

A healthy wage boost

What Are They Likely To Get?

An SUB soon or assurance that it will come later.

A wage boost of around 10¢ an hour plus classification increment changes.

Will There Be Strike?

Chances are even that there will not be a strike.

But heads may become hot at the last mile.

possible to raise the workers' pay —and his prestige.

There are some reports that the steel union chief will plump for a package of 37¢ an hour. The realists in the collective bargaining game feel that he is aiming at one half that figure or about 18¢ an hour. The bombast will be pretty heavy and he will bring out an old weapon which might for the time being be called the secret weapon.

Molony Problem

Dave McDonald with a statesmanlike approach will call for "fairness in negotiations." He will point out that the steel companies have been making pretty good earnings and that the "union asks only that the workers get a fair share in the profits." He will decry the necessity of industrial warfare and will, up to the last minute, steer clear of any statements that would put the steelworkers in the light of throwing down the strike gauntlet.

Lest it look as if the steelworker chief has it all hearts and flowers, it is significant that he has intra-union troubles. These will have a bearing on the steel negotiations. Some people call them skeletons in the union closet. Mr. McDonald has had a little difficulty with a tough Buffalo district union chief named Joe Molony.

No Love Lost

Mr. Molony doesn't love Dave very much and has said so on numerous occasions. In a recent union election for a vice president's job, Joe lost out to the McDonald backed man. But in the process it was clear that Joe Molony has a lot of friends in the steel union—and they aren't all located in the Buffalo area.

There is no question of Mr. McDonald's hold on the presidency of the steel union. But the fact is that Mr. Molony is going to constantly threaten and cop—if he can—the top job in the steel union. He may never be able to muster the strength to do this but he is a cross that Dave McDonald has to bear—and that isn't good news for steel management because it feels a backlash from this situation.

Steel management has its top negotiators who have had plenty of hard and bitter experience. John Stephens of U. S. Steel is an old hand at the game by now. Clifford Hood, U. S. Steel president, is no slouch at labor matters. Even though U. S. Steel as usual is the fall guy in the labor battle, its negotiators and their supporters from other steel firms can be pushed so far and no more. That happened last year when the one day strike was necessary to bring Mr. McDonald down to earth with his demands.

Steel management does not want a strike. It has trouble enough with customers over steel availability without running into another period of broken deliveries, busted schedules and agonizing "makeup" work as the result of a strike. Also, a steel strike just before an election isn't good for either side. There is no sign that the union is itching for a strike.

What about the outcome? Both sides are braced for a gentlemanly pitched battle with no harsh overtones from the bargaining table if they can be prevented. But people are people and some of those in the negotiations have flipped their lids in the past. They could again. If that happens and the sessions become bitter anything can happen.

Best guess now is that labor will go all the way down to the strike path in order to get a healthy wage increase, a supplemental unemployment plan and some other fringes. Whether the union will hold out for a 100 pct union shop is highly problematical. Why should they when they have a reasonable facsimile of it now?

Test of Strength

As to steel management it will go the limit in order to escape a strike and keep things rolling. But steel officials won't go up to any 20¢ package to include the SUB. They're also sensitive about the union shop, and may be willing to go the limit rather than surrender.

The chances are even that both sides will pull back from the precipice at the 11th hour. But they are also even that one side or the other will not pull back in time. Best guess on the package: it will approach 17-18¢ an hour.

WILL IT be peace or war in steel this year? Contract-signing smiles have a way of masking bitterness of negotiating sessions. As usual, Steelworkers' Dave McDonald and John Stephens of U. S. Steel will meet head-on.

HEATING UNITS: What's The Trend?

Iron Age survey points up current trends in use of open flame, electric units, and steam . . . Metalworking respondents include 28 basic industry groups . . . Check reveals some interesting answers.

◆ WHICH WAY is the wind blowing in the use of moderate heat sources in basic metalworking operations?

Wetting a finger to find out current industry thinking along these lines, a recent IRON AGE survey of 1700 larger metalworking plants comes up with some interesting answers.

Purpose of the check was to get an indication of the applications and use of electric, open flame, and steam heating units in nine basic metalworking operations requiring heat up to 1000°F.

Of the 351 plants replying to the query, 128 indicated a trend toward use of the open flame in their operations. Another 119 respondents said the trend is toward electric units, while 71 other plants checked off "steam."

Industries Covered

Where the balance of replies left the question begging, it's assumed that no trend exists toward any one method in those plants.

Major industry categories checked in the survey included ordnance equipment makers, steel mills, iron and steel foundries, non-ferrous smelters, stampers, machinery manufacturers, and the automotive and aircraft industries.

Some of the larger industry groups reporting numerous applications of electric units were: (1) industrial machinery fabricators, (2) electrical equipment manufacturers, and (3) the automotive industry.

Out of 44 industrial machinery manufacturers, 35 indicated 62 applications of open flame, 34 listed 75 operations using steam, and 29 cited 49 uses of electric units.

Of 40 electrical equipment manufacturers answering the inquiry, 30 plants listed 74 operations each in the use of electric units and steam. Twenty-three respondents reported 46 operations using open flame.

And, out of 32 automotive and parts manufacturers answering the survey, 27 plants cited 73 operations using steam; 20 plants indicated 31 operations using open flame, and 16 indicated 26 uses of electric units.

Automotive Picture

Among industry groups reporting a moderate use of electric units were instrument manufacturers, office and household machine producers, stamping plants, and fastener producers. Those indicating limited use of electric units include ordnance equipment makers, metal furniture producers, iron and steel foundries, and nonferrous smelters and mills.

Industries indicating above-average utilization of open flame applications included steel mills, nonferrous foundries, miscellaneous primary metals, structural fabricators, office and household machine manufacturers, and electrical equipment and automotive manufacturers.

Who Decides

Replies citing heavy use of steam showed up among ordnance equipment producers, metal furniture manufacturers, and steel mills.

In reply to the question, "Who decides which type of heat will be used for specific plant operations?", 188 named plant engineers. Other respondents listed manufacturing planning executives and plant managers.

A basic conclusion of the survey points up that at present there is no definite trend in any one direction in the use of one type of heat as against another. And, some observers feel that there probably won't be, at least in the immediate future.

Moderate Heat Sources

in Metalworking

Operation	Plants	Electric	Steam	Open Flame
Pickling	176	21	150	21
Metal Washing	230	24	180	65
Electroplating	136	37	108	11
Vapor Degreasing	219	43	173	28
Baking Finishes	199	92	32	123
Drying Fdry. Molds	61	10	2	52
Press Platens	53	37	19	12
Welding Preheating	145	31	2	123
Fuel Oil Preheating	145	50	119	4
Plants in Sample	351	182	297	258

SPECIAL REPORT

When Are Tape Controls Practical?

Machine tools controlled by punched cards and tape are finding more applications . . . Tool engineers can see latest at Chicago Show this month . . . Automakers show interest in contouring—*By E. J. Egan, Jr.*

◆ TELL A TOOL engineer that you need a setup to machine a million parts and he won't bat an eye. That's because long runs usally justify buying special equipment to mass produce work most efficiently.

But tell the same engineer that you need five of this part, 18 of that one, and 42 of still another before an eight-hour shift is over and you've tossed him a real problem. It's a cinch that it will take too long to make each part by manual machine control, even in the hands of skilled operators.

Jigs and fixtures might help. So might master cams or other machine adjustments to actuate and control the sequence of operations. But these things are expensive to make and take a while to set up. Then there's the matter of storing them safely against the possibility of a reorder.

Punched card and tape controlled machine tools offer one of the most plausible answers to the short run problem. Several types were demonstrated to a mass audience at last September's Machine Tool Show in Chicago. They aroused widespread interest then, are still attracting many curious, hopeful prospects and—some actual customers.

Take Your Choice

Business of supplying and interpreting data via tape, cards, or photo-sensitive film to control machine and cutting tool movements can be relatively simple or quite complex. It all depends on how much automaticity you want and how much money you have to spend.

Units of this type will be among the many new tool engineering developments to be shown at the Tool Engineers' Show in Chicago, March 19 to 23. (See p. 194.)

Tape-Controlled Machine Tools Offer You

1. **Accurate positioning of work for drilling, tapping, boring, milling, piercing, stamping.**
2. **Complete control of intricate contour machining operations, if required.**
3. **Maximum accuracy in preparing and following coded instructions.**
4. **Less need for jigs and fixtures, layout scribing.**
5. **Minimum setup time between changeovers on short run jobs.**

Simplest, least expensive of the tape or punched card control systems are those that merely position the workpiece relative to the tool, or vice versa. This idea appeals to tool engineers seeking efficient ways to make millions of holes in millions of metal parts.

Typical "positioning" controls are those such as the Hillyer Instrument Co., New York, and the Arter Grinding Machine Co., Worcester, Mass., apply to their own and other builders' machine tools.

Generally speaking, such units work from original blueprint dimensions measured with respect to a reference point. It can be the corner of a workpiece, or the intersection of "X" and "Y" coordinates on the part print. The "numbers" for every intersecting length and width dimension at which some hole-processing work is to be done, are then code punched into a length of tape.

As the tape unreels to control machine operation, the presence or absence of punched holes eventually determines the relative positions of the work-holding table and the hole-processing head of the machine tool. Once the hole location is accurately set, actual drilling, tapping or piercing can be done either manually or automatically.

More Jobs

It is possible for tape controls to take on the additional job of changing drilling or tapping speeds and feeds. But in making hundreds of holes in a large electrical circuit panel, for example, accurate positioning is all that the short-run production man is likely to ask.

He wants to avoid layout scribing, or special jigs, and endless

measurements. Someone can always push a button or pull a handle to bring the piercing punch or the drill spindle down.

On the other hand, all hole-making work doesn't lend itself to the speed and accuracy inherent in tape-controlled positioning systems. Where hours must be spent boring a few holes in large castings, a few seconds gained in positioning the workpiece would not be any great advantage.

Contour Machining

However, a step beyond the positioning type of control is that called for where intricate, contoured machining is involved.

Among the best known of these tape - controlled contouring machines are the giant skin and profile milling units produced by Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. The Air Materiel Command has 35 of these machines on order, wants them for the express purpose of machining complex aircraft sections from solid blocks of aluminum alloy.

These machines are operated by impulses carried on magnetic tape, coded originally from blueprint information. There is no need for aircraft manufacturers to waste valuable time on short run parts in making templates and positioning them. Nor is there any need for the host of tool settings and measurements.

New Markets

So far, this costly equipment has not been applied to production operations outside the aircraft industry. However, automobile manufacturers are showing considerable interest in the use of these machines. Mostly likely possibility: Taking new body model measurements directly from blueprints and coding them into the tape controller for guiding the machining of large die cavities.

Consensus is that initial cost and electronic maintenance required by the more complicated contouring machines will keep them out of reach of smaller metalworking shops for some time. But practical, less expensive positioning controls will soon find a way into short-run production.

RAW MATERIALS

ORE FINES: Press and Use

Compressing into blocks makes them usable . . . Lorain Works gets good results from direct charge into openhearth furnaces . . . Iron content ranges from 54-57 pct.

◆ IT'S ALWAYS POSSIBLE to convert a liability into an asset.

National Tube Div. of U. S. Steel Corp. has been doing it for over three years by compressing iron ore fines into cylindrical blocks for direct charging into openhearths at its Lorain Works.

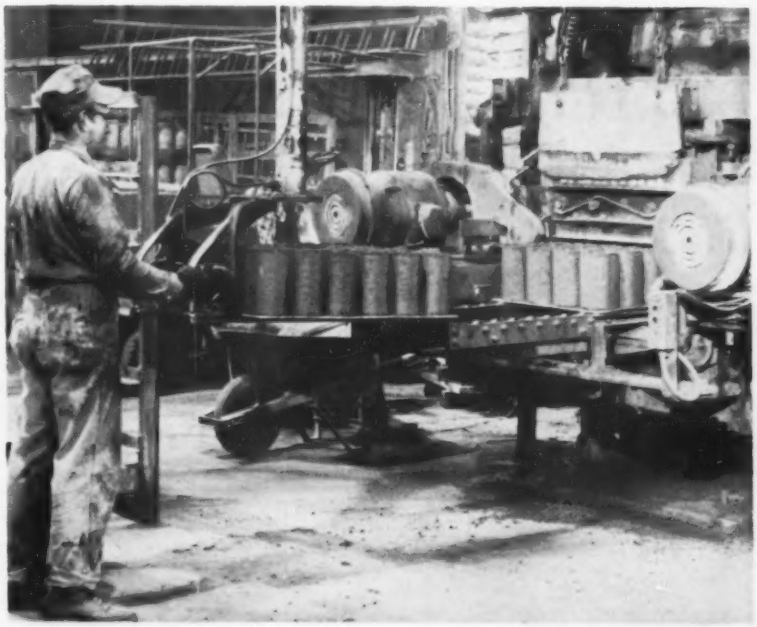
The blocks are made by compressing the fines with mill scale and cement binder on a conventional cinder block machine. Process was developed by Holmes Construction Co., Wooster, O., in cooperation with National Tube engineers.

Results include (1) better analysis control through constant Fe content charge, (2) slightly faster openhearth heats, and (3) lower scrap consumption. Iron content ranges from 54 to 57 pct.

Plant investment by Holmes Construction Co. is about $300,000. The plant is situated within mill property.

About 588 tons per day are being produced in the block plant on a 2-shift, 5-day week. Majority of the product goes into openhearths at Lorain and a lesser amount is shipped to the Ohio Works of U. S. Steel at Youngstown.

Screened ore from the Mesabi is blended in a ratio of 3 parts ore to 1 part mill scale. At the block plant, the blend is mixed with a small amount of cement and water to form a heavy sludge for feeding to the block machine. Finished proportions are iron ore fines 70-75 pct, mill scale 20-25 pct, and cement 5-10 pct.



ORE BLOCKS are gravy for National Tube Div. of U. S. Steel. Ore fines that previously were discarded are now mixed with mill scale, formed in a cinder block machine, cured, dried and charged into an open hearth.

PACKAGING

TINPLATE: Watch Operation Survival

American Can's drive to promote tinless can makes progress . . . But consumption of tinplate continues to set new records . . . More products going into tinless cans . . . Further progress expected by Canco.

◆ WHAT'S THE status of "Operation Survival?"

The campaign of William C. Stolk, president of American Can Co., to promote the tinless can and thus lessen U. S. dependence on foreign tin sources is making headway.

Mr. Stolk feels that "a very high percentage of all metal cans produced in this country will be tinless within the next decade." He predicts that the metal cans of 5 years hence will be "unrecognizable" by today's standards; will be better and more economical.

In its drive to get the tin out of tin cans, American Can has put its researchers to work on a variety of untinned steels, chemically treated steel, aluminum, and aluminum coatings on steel. Nickel and plastic materials also are being tested.

Where It's Used

Canco points to a tinless can for motor oil as one of the first major successes of "Operation Survival." Another is a can for liquid detergent. Under test is a container for liquid shortening. Tinless cans have been developed for antifreeze, insecticides, varnishes, waxes, pharmaceuticals, and tobacco. Pet food, using 2 billion cans annually, is moving slowly to tinless cans. Motor oils consume about 1.5 billion cans per year.

On the other side of the coin, tinless cans are higher cost than conventional tinplate cans. Aluminum and aluminum on steel, and nickel plated steel offer no cost advantages, either. Same is true for plastic-over-steel cans.

Cost advantage of the tin-coated can may not always lie in lower cost of raw materials, but in the speed with which it can be formed. Lines can produce tinplate cans at a 500 per minute clip, a rate which most other processes are not yet capable of duplicating.

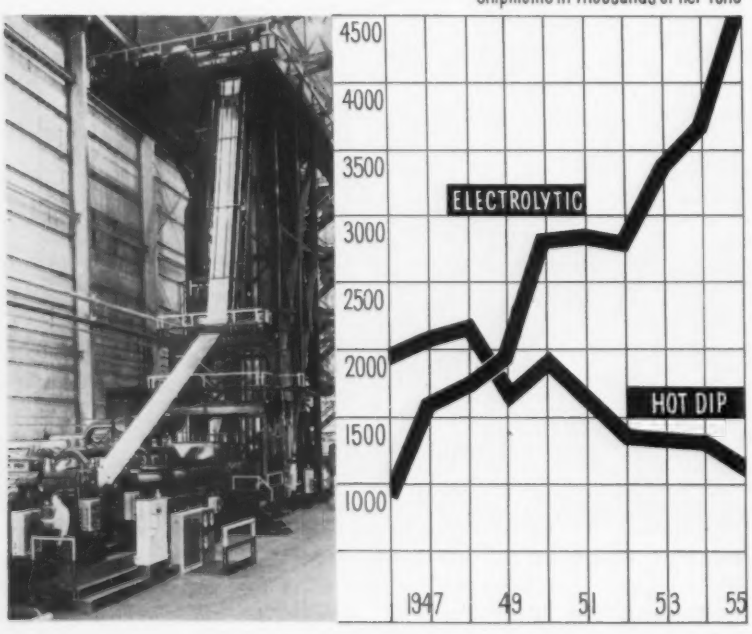
Meanwhile, tinplate shipments continue to set new records as total can production rises in keeping with our increasing population and economic prosperity. Tinplate shipments last year totaled 5.6 million tons, compared with 4.9 million tons in 1954, the previous record. Another rise of 450,000 tons is expected this year.

It's estimated conservatively that can production in 1956 will be up 4-5 pct over last year's record of approximately 38 billion units. Within the next four or five years, output should be "well over" the 40 billion can mark, according to Mr. Stolk.

Tinplate Outlook

With the steel market continuing tight and the outlook uncertain from a steel labor standpoint, canmakers are pressing for all the tinplate tonnage they can lay hands on. Off-the-record admissions from smaller can companies suggest that tinplate inventories in the industry are considerably lower than previous reports have indicated. Another reason for attempting to lay in a good inventory: the possibility of a price boost in April when semiannual contracts with tinplate producers are up for renewal.

Trends in Tinplate



Mr. Stolk's arguments for "Operation Survival" include the fact that nearly 60 pct of the world's present production of tin comes from overseas areas that lie directly in the path of communist aggression. "It is to be noted, however, that almost 75 pct of the free world's known tin supplies lies in this same critical part of the world."

Mr. Stolk says that since 1941, when American Can began its campaign, the industry has saved almost 260,000 tons of tin worth approximately $500 million.

New Food Can

Canco recently introduced a food can with an aluminum coating instead of tin, and with sideseams that are welded instead of soldered. The welded sideseams not only eliminate use of tin and lead solder but also are said to provide much stronger cans than conventional soldered types.

Canco says the aluminum coating on both bodies and ends provides a durable and attractive finish that gives even better protection than tin to the outside of cans. Insides of the cans are lined with special enamel coatings designed to give added protection to specific canned products.

Tinplate producers themselves have done a good job of conserving tin. Dual coat electrolytic tinplate, a development of the last several years, enables producers to deposit on one side of the steel a coating sufficient to protect contents of the can while depositing a lighter coating for the can exterior. The electrolytic process itself saves tin compared with the hot dip process.

Seek Financing Approval

Crucible Steel Co., Pittsburgh, is seeking SEC permission to sell 164,117 shares of its $25 par common stock to aid in financing a $20 million expansion program.

Proceeds of the sale, to be underwritten by the First Boston Corp., will be added to existing cash, retained earnings, and depreciation, depletion and amortization to meet expansion costs. Stock will be offered to present common stockholders at the rate of one for 10.

PLANNING

STAINLESS: Market in Atoms

Nuclear developments hold promise for stainless steel . . . Republic will ship 500 tons this year for nuclear developments . . . Only the beginning—By G. G. Carr.

◆ STAINLESS STEEL producers are watching the infant atomic energy industry as fondly as doting parents. And there is every sign that atomic energy applications will mature into one of stainless steel's greatest markets.

Just when this awesome youngster will be fully grown is anybody's guess. The existing market is small, but in atomic energy the unexpected is commonplace. Republic Steel Corp. estimates that even this year it will ship over 500 tons of stainless for nuclear power plants. And a swift rise to 40 times as much wouldn't surprise the company.

Robert P. Petersen, Republic's director of nuclear research, estimates that an average-size nuclear power plant will require well over 100 tons of stainless. A Consolidated Edison Co. design for utility service calls for 100 tons in the reactor unit alone. An average reactor for middle-size cities will also need about 50 tons of stainless for control elements.

More At Sea

These figures are for fixed, land-based nuclear power plants. Marine and aircraft installations will probably require even larger percentages of stainless, relative to total size, since fixed reactors are expected to rely heavily on thick, fortress-like walls of concrete for shielding. Such concrete shielding would be most impractical for ships and virtually impossible for aircraft.

Complete design details are not yet generally available, but enough have been declassified to give at least a broad idea of major stainless applications. The Navy's atomic sub, the *Nautilus*, for example, used sizeable tonnages of stainless in the reactor vessel and shield tank and the piping for the liquid sodium coolant. Overall, stainless will be used in nuclear power plants principally for mechanical parts, pressure vessels, some structural units and partitions, and control units.

Types Used

Current specifications for reactors and internal structures call for such stainless types as 347 or 304 ELC, either in solid form or cladding. Extensive use of stainless is made in the coolant system. Most reactor heat exchangers are now built of 347 or 304 ELC, again either solid or clad. Stainless may also be used in the pump along with titanium and zirconium. Designs are pointing to coating only exposed elements with these materials, but at the present time the pumps are built entirely of them. Valves and fittings are often made of stainless, as well as high nickel alloys, titanium and other corrosion resistant materials. Stainless clad carbon steel is especially suitable for tanks and auxiliaries in the coolant system removed a reasonably safe distance from direct contact with uranium.

Disposable Factor

Paradoxically, an important phase of the market for stainless in atomic uses will be expendable applications. Stainless, with its high corrosion resistance, is not usually thought of in terms of its expendability, but it has been found to be the best metal from which to make containers for nuclear power plant wastes.

Eventually, the "incidentals" market could, in total, be the largest part of the stainless role.

INDIRECT SELLING: It Can Be a Short Cut

U. S. Steel finds Operation Snowflake apparent success . . . Alcoa uses different tack . . . Lukens Steel shows how smaller producer can reach specific markets . . . A natural for metals—By G. J. McManus.

◆ THE LONG WAY around may be the shortest way to the market. That's the experience of some of the basic metals producers who are trying indirect selling.

In this selling procedure, basic producers are going beyond the immediate customer in their marketing. They are appealing to the customer's customer, going straight to the end product consumer.

Indirect selling has two objectives: (1) to sell more metal, (2) to secure customer goodwill. In the few special areas where metal supply permitted tangible measurement, the new technique has looked very good. In the matter of goodwill, there is no question that companies are building ties that could be tough on competition when demand eases off.

Snowflake Example

U. S. Steel moved into consumer promotion in a big way two years ago with its Christmas "Snowflake" campaign. Idea was to promote sales of major appliances through TV and publication advertising. U. S. Steel did not plug any brands or stores in its own advertising but provided the means for manufacturers and retailers to tie in with the campaign. The Snowflake symbol tied it all together.

Last year, the company came back with an even stronger Snowflake. Campaign was lined up earlier, provided more extensive coverage at the local level. In this and other consumer promotions (Quicknic for canned foods; Wifesaver for steel kitchens), U. S. Steel plays down its own name, pushes the product type.

Wrap It Up

A slightly different tack is taken by Alcoa. The company has just come out with an aluminum foil wrap for home use, backed by the biggest advertising push Alcoa has ever put behind a single product. The promotion will serve a dual purpose, not only promoting the product, but as an "institutional promotional tool" to get the company name recognized in the home.

In separate campaigns, Alcoa will push summer furniture, awnings, screening, sporting goods, and Christmas goods. Manufacturers of these items will be invited to use the Alcoa label. Packaging people will likewise be offered small Alcoa labels for use on foil wrapped goods.

Labels have been tried in steel without too much success. Most fabricators have more than one steel supplier. Big companies aren't interested in leaning on anyone else's name. There is a question of supplier's responsibility for the quality of a product on which its name appears.

Big Campaigns

Alcoa, while denying any intention or ability to control the quality of end products bearing its name, admits there have been kickbacks from users. However, the company feels the problem can be worked out without any departure from normal supply relations.

U. S. Steel is not out to carve its own intials in the American

Getting Around Your Customer

HOW

▪ HOW Indirect selling includes: advertising the customer's product to home consumers or industrial users; providing a customer with information about his market; providing technical assistance to the customer's customer.

WHY

▪ WHY Indirect selling secures customer goodwill, promotes sales for your industry. It provides occasions for top-level contacts inside your customer's plant. It keeps you in touch with coming developments.

WHEN

▪ WHEN Indirect selling pays off: When you're big enough to profit by industrywide gains; when you can direct effort to areas that assure sales of your specialty; when quality of your own product is controlled by industrywide standards; when your immediate market is so small there is little need for direct selling; when your immediate customers are too small for effective market analysis or advertising.

home. But it does make sure that the immediate customer knows of its efforts. When the company launches a program on farm products, construction or cutlery, marketing men call on fabricators, show them films and slides, leave a few reminders of the program.

The initial Snowflake was more than just a few magazine ads and TV commercials. U. S. Steel contacted appliance makers (100), distributors (2500), retail outlets (80,000) and others. Over 75 manufacturers tied in with the program. Norge directed $100,000 worth of advertising into a tie in. Sears Roebuck put major appliances in its Christmas catalog for the first time. U. S. Steel figures its $100,000 effort snowballed into a $5-$6 million program.

Small Companies Too

Relatively small companies can't cover the countryside with their promotion, but they can apply indirect selling very effectively in selected areas close to home. Armco Steel has long been noted for its market development programs. Lukens Steel has put together a strong program of aid to their customers.

Advertising is just one phase of Lukens indirect selling. Marketing service and technical service also share the load. Lukens specialty steels are sold primarily to fabricators for the processing industries — chemical, petroleum, and paper.

Marketing service men from Lukens will go out to the engineering departments of chemical or petroleum companies. They will work with engineers in determining new requirements for processing vessels. They will attempt to steer designers into Lukens-type steels.

Technical Help

Information gleaned will be provided the fabricator in two forms. Specific job leads, when the end user permits, are transmitted to fabricators by Lukens. General market information is put into report and likewise given the fabricator.

In a case where a job calls for special work, Lukens technical service will provide assistance to both fabricators and end users. Even if the fabricator is not a regular customer, the technical service men will offer to help out on welding and other problems. At the same time, the fabricator will probably receive a call from a Lukens salesman.

Consumer Promotion

The advertising and sales promotion department at Lukens devotes a good part of its budget to promoting customers' products. Last year, a national advertising campaign played up the theme of replacing old equipment. As in the case of U. S. Steel, the company pushes the general type of equipment rather than any one manufacturer's line.

In addition, the advertising department works with the technical people in preparing instructional and semi-promotional pieces. A booklet on cleaning and maintenance of clad steel has drawn requests from fabricators for 8000 copies to be mailed to their customers. A table of comparative prices for clad steel and alloy steel is getting a big play.

The company feels indirect selling has done a job. During the 1953-54 lag, when selling was important, Lukens feels it got considerably more than its traditional share of the market.

Smaller fabricators are particularly grateful for assistance in market analysis, technical service.

In any contact with a company on a marketing service, the Lukens salesman and the fabricator purchasing agent get copies of all correspondence. Apart from formal meetings, the service function presents innumerable opportunities for representatives to get into the customer's plant and on a very pleasant footing. Lukens has cracked more than one tough purchasing set-up by approaching sales and engineering people with offers of service.

Did Indirect Selling Help?

(Thousands of Net Tons) (Steel for Appliances)

John H. Van Deventer

John H. Van Deventer, formerly publisher and editorial director of THE IRON AGE, died early this week at Peach Lake, N. Y., at the age of 74. He had been with the Chilton Co. from 1930 to 1946. He leaves 9 children, 26 grandchildren and 4 great-grandchildren.

DEFENSE

AIRCRAFT: Where Should the Money Go?

Search for excessive profits raises other issues . . . Government ownership of aircraft plants pointed out . . . Planemakers put all they can into facilities, but defense requires more—By *N. R. Regeimbal.*

◆ CONGRESSIONAL INVESTIGATORS, probing costs and profits of military aircraft procurement, are critical of high executive salaries and widespread use of government plant and equipment which they claim permits plane makers to boost their net worth at taxpayers' expense.

So far, however, they have drawn an almost complete blank in their quest for evidence of alleged excessive profits by the aircraft manufacturers.

The probers—a House Armed Services subcommittee headed by Rep. F. Edward Hebert, D., La.—are actually squirming uneasily because they have laid bare the difficult problem of how much the taxpayers should fork over to maintain a vigorous military aircraft industry as a hedge against another emergency.

Nobody Wins

Problem is that many aircraft firms now are almost 100 pct government contractors — including such giants as Boeing, North American Aviation, Glenn L. Martin and Grumman. When the lawmakers criticize the practice of permitting firms to use government plant and equipment rent free, the industry replies that if makers were charged rent for the facilities, the rent would be added onto the cost of each plane and billed to the government.

Some, like Grumman's Lein A. Swirbul, are concerned because "Government ownership of our business has increased" in the past 15 years. In 1940, Grumman owned its entire plant and facilities, now owns $15.6 million in equipment, rents $24.3 million from the government, uses another $27.3 million rent free. This is far from excessive compared with other U. S. plane makers (see table).

In addition, profits per plane are figured on a percentage of the allowable costs, so that if the cost increases, profits also go up.

All the plane makers, even those building for the relatively small commercial market, had tough times between World War II and Korea. With the country committed to a permanent defense program, they are doing well now. But since competition in the military aircraft industry is for design, and contracts can be cancelled when a competitor develops a newer or better model, the firms do not enjoy a completely safe existence.

Had Lean Years

Profits of the firms have been rather small, when figured as a percentage of sales. The industry as a whole has been running just a little over 3.2 pct in the last few years. Lawmakers, however, charge that salaries for executives are far too high, since they are all charged, at least indirectly, to the government. Industry spokesmen reply that competition within the industry and with other industries for top management, engineers, and skilled technicians, is heavy. Good salaries

How Much of Aircraft Industry Does U. S. Government Own?

Company (In Millions of Dollars)	Own Plants and Equipment	Rents from U.S.	Uses Rent Free
Boeing	$ 53.1		$150.0
Grumman	15.6	24.2	27.2
Martin	11.1		41.5
North American	18.0		95.4
McDonnell	12.3	37.3	
Fairchild			38.9

and bonuses—a bone of contention—are necessary to keep good men, they argue.

Get the Brass

The congressmen are also blasting the practice of some aircraft firms of hiring retired generals and admirals at "fabulous" salaries, charging the cost against the government contracts, when they don't do anything. Industry spokesman say the experienced military men give technical advice needed to develop military planes.

Plane makers are leveling some criticism of their own at the government procurement policies, particularly at administration of renegotiation provisions.

Two Sides

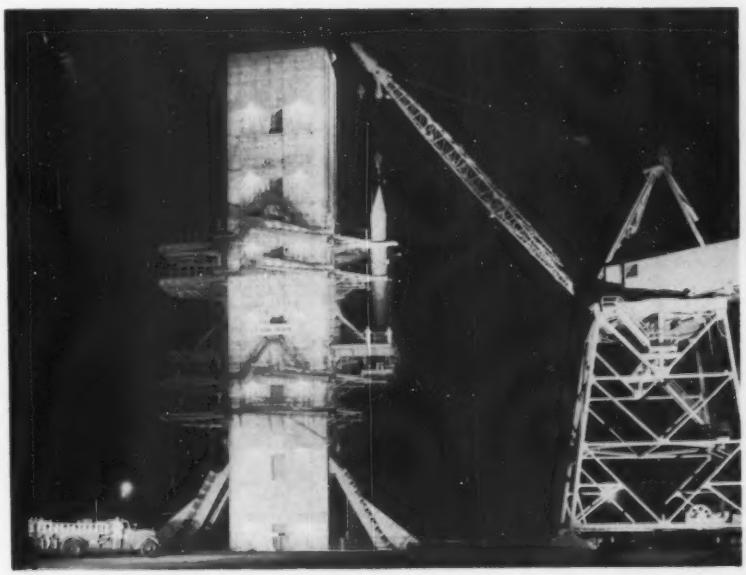
Aircraft contractors should be permitted to make a decent profit, a Boeing official charges, so that more funds can go into research and development to keep this country ahead in the technological race with Russia. Because of stringent profit restrictions, he contends, research in many vital fields has been slowed.

The lawmakers are also critical of some firms for spending large sums for advertising although all their business is with the government. Building company prestige, the firms answer, is essential to personnel recruiting.

Plane contracts are negotiated twice before final payment (each company is also subject to renegotiation on its total government business each year), and the probers are going to give Pentagon order-placers a rough time for allowing "marginal expenses" to be added to the cost of planes, particularly what they contend are "hefty bonuses on top of healthy salaries for company officials."

Hearings will go on for the rest of this session of Congress. Subcommittee plans to question 15 major military aircraft suppliers in detail; ask the military procurement officers to explain the contracts, and possibly hear from major aircraft subcontractors.

Outcome of the hearings is wide open now. Could be just political ammunition for the fall election.



NIGHT sky will soon receive this huge Redstone guided missile shown in the process of being lifted into place on the 15-story high static test tower, illuminated by a myriad of searchlights, for the test firing.

Splash:

Criticism brings unveiling of long-range missile.

Stung by charges that United States has fallen behind Russia in the guided missile race, the Defense Dept. is stepping up development of long-range projectiles and telling more about progress to date.

Recent moves have included:

Public unveiling of Redstone (1500 mile) and Snark (5000 mile) guided missiles.

Announcement of installation on two submarines of launchers for the missile, Regulus.

Statement by Air Force Secretary Quarles that the military position of this country in relation to Russia was basically unchanged.

Why We Lag

Defense Dept. gave out little performance information on the long-range missiles. The Department showed that we do have two missiles in the testing stage: the Snark and the Redstone models.

Photographs of the test grounds, showing massive test and fueling emplacements, indicated why development of the large missiles takes time. And the release confirmed the fact that we are still relying on German technology in our missile program. Dr. Wernher Von Braun, who came to this country after World War II work on German V-bombs, heads a guided missile team at Redstone.

Behind all this publicity may be some political considerations; the Democrats will undoubtedly go after the Administration on the missile issue in coming months; but there is also real concern in Defense circles that criticism of our own striking force gives encouragement to Russia.

Secretary Quarles says that even if Russia were a little ahead in missile development (which he doesn't concede), we could still retaliate in strength from any attack. His remarks make it clear there is some worry about the way critics have been running down the retaliatory force.

EXPANSION IN INDUSTRY

More Capacity:

Detroit Steel to spend additional $20 million.

Twenty million dollars will be spent for 210,000 additional tons of basic steelmaking and finishing facilities by Portsmouth Div., Detroit Steel Co. The project was announced on completion of a $70 million program. Completion of the new program is expected by late 1957. It will raise rated capacity to 1.5 million tons.

New facilities to be installed are a 275 ton openhearth furnace, 2 additional hot rolled sheet and strip stands and a coiler, additional cold rolled sheet and strip finishing facilities, a sintering plant for ore concentration and flue dust reclamation, additional soaking pits and scarfing equipment.

Cash generated internally during the period is expected to pay for the program. But a revolving $10 million credit has been set up with a group of banks.

The new expansion will raise Detroit Steel's investment in Portsmouth to over $90 million, steel capacity has been increased over 125 pct since acquisition in 1950. It now ranks 15th nationally in steelmaking capacity.

Net sales last year were 97 pct over 1954 and net earnings 632 pct higher. Net profits for 1955 rose to $6.3 million on $101 million net sales.

Atomic Power Plants

San Francisco area will begin getting electricity from a nuclear power plant next year when the Pacific Gas and Electric Co. puts a new reactor in operation.

The plant, to be built by General Electric Co., will cost between $3 million and $4 million and have an initial capacity of 5,000 kw and an ultimate capacity of 10,000 kw. It will be a pilot model of the 180,000 kw, $45 million nuclear plant GE will build later for Commonwealth Edison at Dresen, Ill.

Similar project is being tentatively planned by Florida Power & Light Co., Florida Power Corp., and Tampa Electric Co. The aim is to build a full-scale atomic power reactor in the neighborhood of 200,000 kw.

Other commercial power plants being planned: Consolidated Edison of New York, 236,000 kw plant near Peekskill; Pennsylvania Power & Light Co., 150,000 kw in Eastern Pennsylvania. All these plants will be privately financed.

"RADIATORS" to keep toll plazas of the Indiana Toll Road free of snow and ice in frigid weather will be laid beneath four in. of concrete. Pipefitters assemble the grids before installing them in approaches of the highway which will cross the state to connect with other turnpikes.

Expansion Briefs

Firth Sterling Inc., Pittsburgh; zirconium producer; new facilities to double present capacity for vacuum melting reactor grade zirconium sponge.

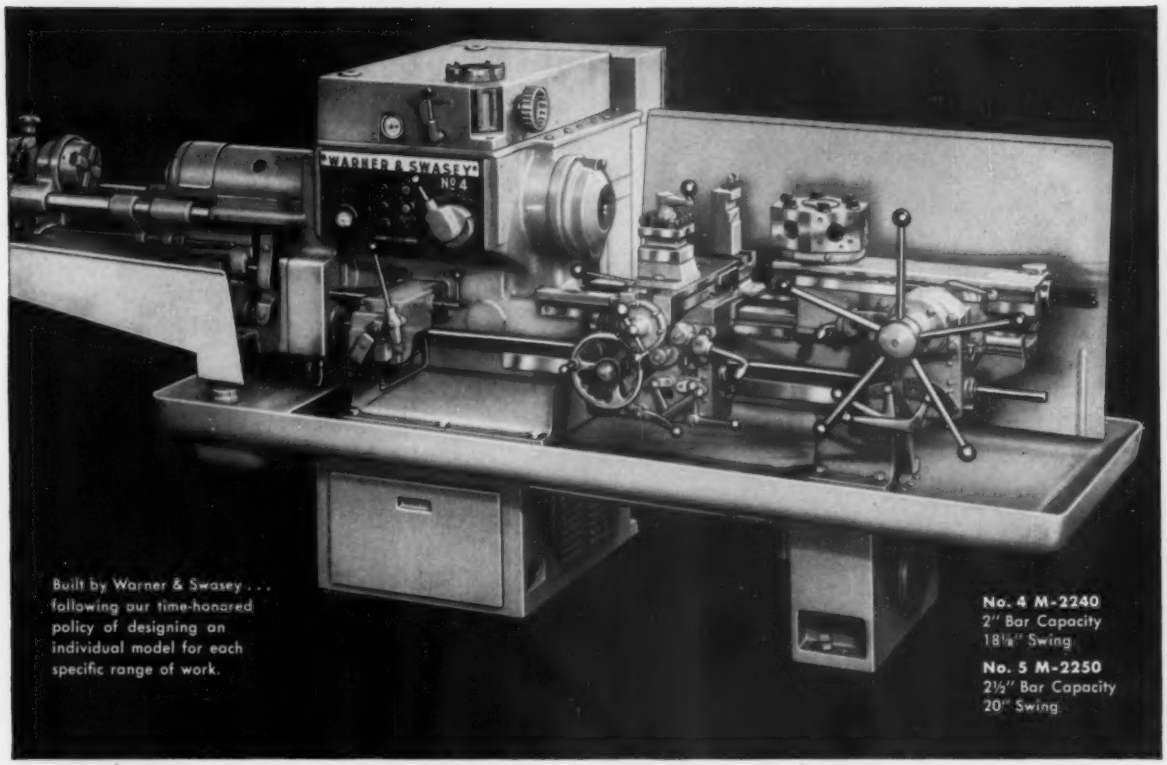
Republic Steel Corp., Berger and Truscon Div.; expansion of warehouse facilities in Detroit.

Woodward Iron Co., Birmingham, Ala.; development program includes construction of sintering plant, expansion of coal mine and new power generating equipment; cost $8.7 million.

Alloy Metal Sales Ltd., subsidiary of International Nickel Co. of Canada Ltd.; expansion of offices and warehouse, Toronto; cost $950,000.

Carolina Aluminum Co., subsidiary of Aluminum Company of America; requested license from Federal Power Commission to complete development of hydroelectric resources of Yadkin River in N. Car.

Wheeling Steel Corp., new continuous strand annealing furnace, increase finishing capacity for electrical steel; Beech Bottom, W. Va.



Built by Warner & Swasey . . . following our time-honored policy of designing an individual model for each specific range of work.

No. 4 M-2240
2" Bar Capacity
18⅛" Swing

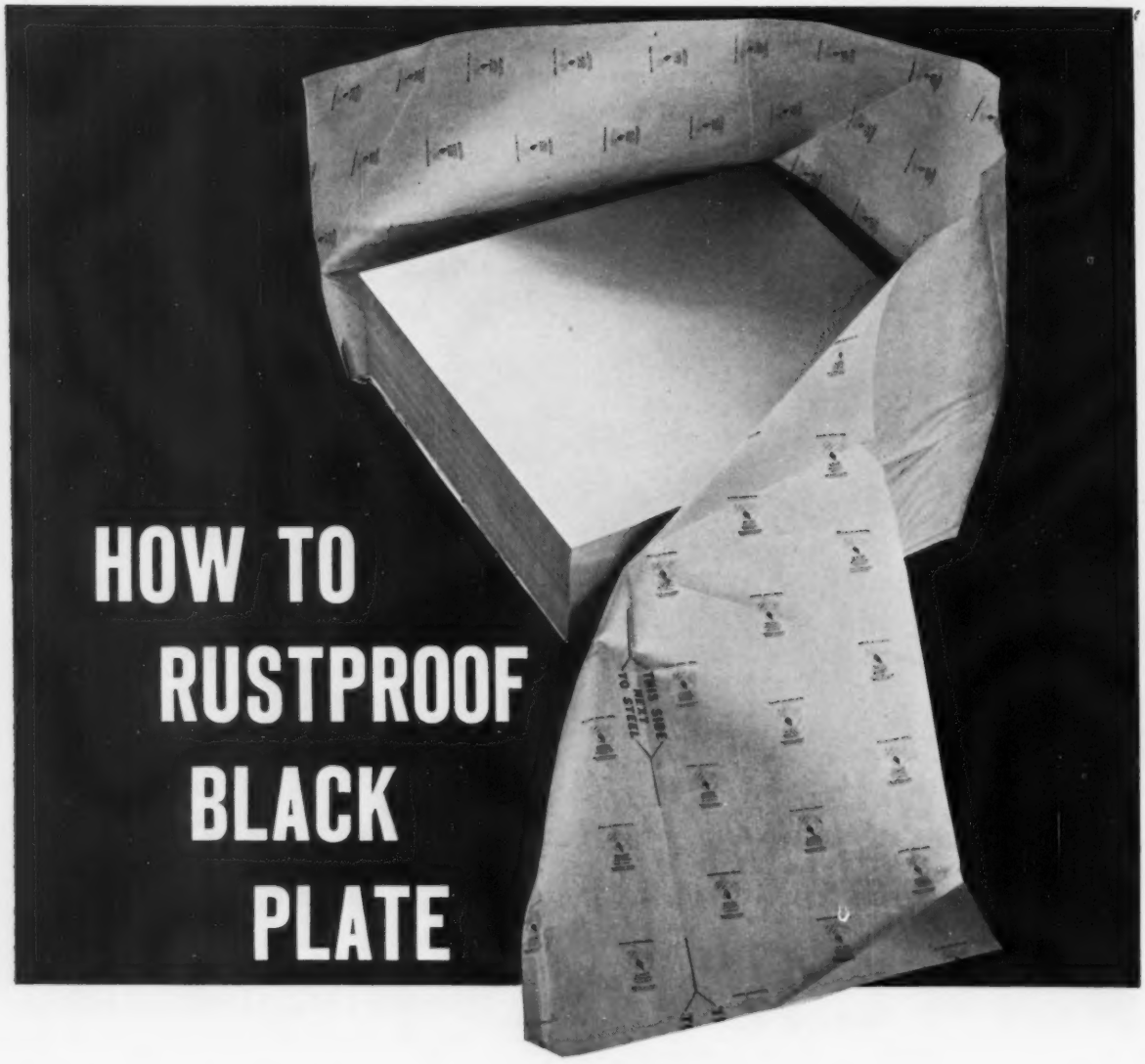
No. 5 M-2250
2½" Bar Capacity
20" Swing

NEW WARNER & SWASEY No. 4 and No. 5 RAM TYPE TURRET LATHES

- Higher Speeds
- Instantaneous speed changes—sliding gears eliminated
- Direct-acting hydraulic clutches—need no adjustment
- Smooth, quiet running, helical high-speed gears
- Short, stubby shafts—anti-friction bearings throughout
- Single lever control for forward, reverse, brake and free spindle
- One lever control for speed changes and 6:1 ratio high-low shift
- Two-speed motor provides 24 *unduplicated* speeds, forward and reverse, with a 62.5 to 1 over-all range
- Flange-mounted, direct-drive motors—no belts
- Patented direct-reading speed preselector—calibrated in rpm's, surface speed and work diameter
- Rigid, heavy-duty, high speed hydraulic bar feed with adjustable feed-out
- Single lever control for hydraulic collet chuck and bar feed
- Zoned operating controls for effortless machine operation
- One-piece head and bed for greatest possible accuracy
- Larger, separate oil sump provides cooler filtered oil
- Retains Warner & Swasey standard tooling interchangeable with your present models

WARNER & SWASEY
Cleveland
PRECISION MACHINERY SINCE 1880

YOU CAN PRODUCE IT BETTER, FASTER, FOR LESS...WITH A WARNER & SWASEY



HOW TO RUSTPROOF BLACK PLATE

Rust is a problem anytime, but it's particularly serious with black plate. On this light gauge, dry, uncoated steel, rust can start from a fingerprint. "Sweating" due to sharp temperature changes will cause immediate rusting on surfaces and edges.

Leading mills are now eliminating rust problems by packaging black plate in Ferro-Pak, Cromwell's volatile corrosion inhibitor paper. Chemical vapors from Ferro-Pak form an invisible film around the steel that prevents rust from getting a start, even when moisture is present.

The new Ferro-Pak sheet above was custom-made by Cromwell's "Paper Engineers" to meet steel mill requirements for shipping black plate and dry sheet steel. It is water-proof, strong, yet highly flexible and easy to handle. Its chemical rust inhibitor is non-toxic . . . compatible with oil . . . stays effective for long periods even when the humidity soars.

Whether you're a shipper or a buyer of steel, it will pay you to specify Ferro-Pak wrapping wherever rust is a problem. For an interesting idea brochure on many uses for Ferro-Pak, write **Cromwell Paper Company, 4803 South Whipple St., Chicago 32, Illinois.**

FERRO-PAK® by Cromwell
"Paper Engineers"

RUSTPROOFING A FREIGHT CAR. Ferro-Pak is used to line sides of car and to interleave coils, transforming ordinary freight car into huge rustproof package.

REPORT TO MANAGEMENT

How Many Remember the Big Depression?

For almost two decades now, depression psychology has had varying effects on our economy. There's no escaping the confidence factor in consumer buying, and lingering fear of a repetition of '29 and the depression of the 30's has always been present.

This is particularly true in major purchasing decisions, like buying a house, for example. If you went through the depression, you thought a long time before buying your first house, waited a long time before buying a bigger one.

But those of you who experienced the demoralizing effects of the early 30's are becoming a minority in the home buying group. And that's not to be taken lightly in evaluating the housing market for 1956.

Why Housing Slump Didn't Last

The potential home buyer is a young man whose only recollection of the depression comes from what he reads or from the advice of his elders. Chances are, he has worked steadily for four or five years, has reasonable confidence in the future, and no experience at all in a really serious depression.

As long as he is working, he will keep spending. His family will grow, unless he's an exception to the statistical pattern that indicates an amazing willingness to contribute to the climbing birth rate. This means moving out of the apartment, into a larger house, or just leaving the in-laws.

Home building will not fall off to any great extent while these circumstances exist—and while it's still cheaper to build or buy than to rent.

Look at the Figures

You noted the slump in housing starts last summer when credit terms were tightened. But have you checked the latest figures?

The Veterans Administration reports that requests for appraisals are up—a good indication that more home buying is on the way. And Dun & Bradstreet reports construction activity "spurted sharply upward" in January. Volume of building permits was the highest January level since 1951, up 23.4 pct over December.

And what's wrong with a figure of 1.2 million new homes, the bare minimum that is now expected? It isn't generally realized that building has been extended to the limits, with shortages of many materials.

Are Current Profits Inflated?

You may have wondered how your company's present profit figure compares with the level of the 20's, a period that might be compared with the current wave of prosperity.

According to a study by the Machinery and Allied Products Institute, your profits may not be as high as you think. For one thing, MAPI believes that reported postwar figures have been grossly exaggerated, 28 pct to be exact, over the corrected rate.

Using the corrected figure, postwar profits are much less than the predepression era. For the past decade, profits averaged 10.6 pct of income compared with 19.4 pct for 1925-29.

Materials Prices Go Up

There's no point in indulging in wishful thinking about prices. Few are going to go down, most will go up. Even if the next few months saw a business decline (which they won't), prices of most materials will hold or climb.

The European demand for metals is the inflationary factor to a great extent. Scrap and copper in particular are involved in an international tug-of-war which keeps copper climbing and scrap from declining to any great extent.

INDUSTRIAL BRIEFS

International Experiments . . . The Research & Control Instruments Div., North American Philips Co., Mount Vernon, N. Y., has been appointed distributor in the United States, Alaska, Hawaii and Puerto Rico for the complete line of Hart High Pressure Equipment, designed and manufactured in Rotterdam, the Netherlands, for the generation and measurement of pressures up to 10,000 atmospheres for experimental use. Most of the research will be conducted upon iron, but other metals also will be used in the study.

Computer School . . . Wayne University's Computation Lab. is offering a summer training program of three weekly courses dealing with electronic computers and their business and industrial applications. Courses are scheduled for July 23-28, July 30-Aug. 4, and Aug. 6-11.

First Run . . . "Men Who Make Steel" is the title of a new 28-minute color motion picture filmed in Republic Steel Corp.'s mills, mines, and plants throughout the nation. It describes the important roles played by men and women in the production of steel. It will be distributed nationally to organizations through Modern Talking Picture Services, Inc.

Low Voltage . . . The Trumbull Components Dept., General Electric Co., has formed a subsidiary Company, Caribe General Electric, Inc., to operate a plant in Palmer, Puerto Rico, for the manufacture of low voltage electrical, distribution, protective, and disconnect devices. Scheduled to be in operation in the summer of 1956, the plant is expected to employ 125 people. The building will comprise approximately 80,000 sq. ft.

Tongue-Twisters . . . A planned expansion of 30 million lb per year of ethylene oxide production capacity at the Dow Chemical Co.'s Texas Div., Freeport, is expected to be completed in late 1956. This is in addition to a 60 million lb increase in ethylene oxide-glycol capacity last September. Ethylene oxide serves as an intermediate in the manufacture of such products as glycols, synthetic fibers, surface-active agents, emulsifiers and ethanolamines.

On the Ball . . . SKF Industries, Inc., Philadelphia, announces the appointment of the TEK Bearing Co., Inc., Bridgeport, Conn., as an authorized distributor of SKF ball and roller bearings.

Automation Lab . . . Beckman Instruments, Inc., Los Angeles, Calif., has established the Shockley Semiconductor Lab. to develop and produce transistors and other semiconductor devices in the field of advanced electronics for automation.

"Irma, there is no such thing as cooking gin!"

Study Breaks . . . A two-year research project to investigate fracture of metals will be launched by the Northwestern Technological Institute, Dept. of Metallurgy, supported by the U. S. Air Force. The study will complement research begun last June by Northwestern metallurgists on structural changes in metals. Both investigations are sponsored by the Office of Scientific Research Air Research and Development Command. Study will include causes of fracture of metal parts at extremely low and high temperatures, and effects of oxygen, carbon, and other elements upon the strength and brittleness of metals at various temperatures.

Blow Ups . . . The Haloid Co., Rochester, N. Y., announces establishment of the Xerox Processing Laboratories in Chicago, offering a novel xerographic service to blueprint, photocopy, and microfilm firms. Service is made possible by a new type of copying machine called an Xerox Copyflo Continuous Printer, which makes enlargements from microfilm.

South and West . . . Baldwin-Lima-Hamilton Corp., Construction Equipment Div., Lima, O., has appointed Mineco, Inc., Bartow, Fla.; Southern Equipment Sales, Inc., Jackson, Miss.; and Hall-Perry Machinery Co., Butte, Montana, distributors of construction equipment.

Lifts Up . . . Industrial use of mechanical materials handling equipment hit a record high in 1955, according to The Material Handling Institute. Bookings were 21.46 pct higher than 1954. In view of decreased government purchases, the bookings represent a 35 pct increase in bookings for industrial customers.

FACTS

about

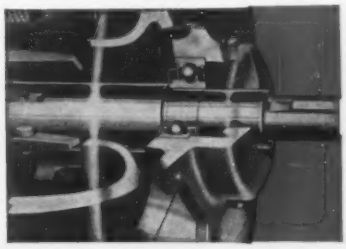
NEW DEPARTURE

BALL BEARINGS

Self-sealed bearings simplify design... cut maintenance costs

New Departure originated self-sealed ball bearings to eliminate the most common causes of bearing wear and failure—such as abrasive dirt and improper lubrication. Since then, more than 300,000,000 New Departure sealed bearings have been produced in various types to fit the specific requirements of industry. Seals are available to keep out foreign matter, ranging from dust and dirt to corrosive gases . . . to retain lubricants, varying from heavy grease to light oil . . . to provide the protection that assures longest life.

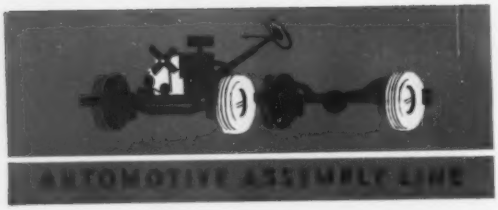
New Departure's latest advance, Sentri-Seal, embodies exclusive features which importantly improve both bearing performance and range of application. Because of its design, Sentri-Seal provides controlled, highly efficient sealing with low torque and is not materially influenced by axial movement due to bearing end play within prescribed tolerances.



Sealed ball bearings offer the electric motor and machine tool builder many advantages. They simplify design, make it possible to mount motors in any position, cut maintenance to a minimum, and eliminate the need for relubrication for long periods of operation.

WRITE FOR COMPLETE INFORMATION ON NEW DEPARTURE SEALED BEARINGS!

NEW DEPARTURE • DIVISION OF GENERAL MOTORS CORPORATION • BRISTOL, CONN.



Is Auto Picture As Black As Painted?

Not if looked at in proper perspective . . . Cutbacks have solved inventory problem . . . No further curtailments seen . . . Spring selling season is just ahead . . . Steel orders picking up—*By T. L. Carry.*

◆ THERE ARE certain people in Detroit who could make their living as professional worry warts. These are the people who view any kind of a situation with alarm and they have become even more outspoken since the auto companies started cutting back.

Just how bad are the cutbacks here and what has been the effect on other industries?

According to Ward's Automotive Reports, production up to the last week in February was running 16.8 pct behind the comparable period in 1955. As of Feb. 24, a total of 1,330,779 cars and trucks were produced in the U. S. and Canada. The total is 185,082 units less than the number produced in the same period last year.

Nine Days' Work . . . At the current rate of production, it would take nine working days to make up the difference. On this basis alone it can be seen that the cutbacks are not as drastic as some people believe.

However, let's look at the whole picture. Two things, supply and demand, forced the cutbacks in the first place. Cars were not selling as fast as they were being produced in the last quarter of 1955. As a result, new car stocks totaled approximately 850,000 units at the end of January despite factory sales of 653,840 vehicles.

Efforts by various automakers to balance out inventories resulted in a pickup in sales during February. Sales for the first 20 days of the month were so good that the experts are guessing that the stocks on hand have been cut in half.

Production for the month of February is estimated at 557,000 units. Thus, even though sales were good in February, the number of cars on hand is going to stay just about the same.

All in Perspective . . . Taken by itself, 800,000 cars is a lot of cars, but stocks must be measured in relation to sales or the picture becomes distorted.

To gage the situation accurately the stocks must be considered on a "day-supply" basis. That is, it must be determined how many days it will take to sell the number of cars on hand. In January it was 44 and it is estimated that it dropped to 42 at the end of February. The lower the figure gets, the better the situation is. With the spring buying rush just around the corner, the figure is going to drop noticeably.

This doesn't mean that auto production is going to pick up again with a bang. It means that the number of new cars on hand is going to drop and that the cutbacks, which weren't too bad in the first place, aren't going to get any worse. In fact, things stand a good chance of getting better.

Coming Back Strong . . . From a supplier standpoint, notably steel, the automobile cutbacks haven't amounted to much. Purchasing agents in other industries can attest to this.

The automakers turned down some of their steel allotments for

OUTRIGGER mounted on Mercury test car is necessary to keep car from rolling over on high speed turns designed to try out tires and steering gear under extreme conditions. Tests are at Arizona Proving Ground.

Unique Plastisols make metal finishing news

◆ **Tough, thick, rubber-like chemical resistant coatings have opened up new opportunities for far better metal protection at lower cost . . .**

◆ **Application limitations overcome by Unichrome vinyl compounds . . .**

Plastisols are viscous, resinous liquids that take on a rubbery look and feel when baked. They form thick, chip-proof vinyl coatings with exceptional corrosion resistance, and high dielectric strength. In the past, application difficulties limited their use. But plastisols have become real production coatings now . . . applicable by almost any conventional method.

SPRAYABLE

The first practical sprayable plastisol, Unichrome Coating 5300 has extended use of plastisol corrosion control to large metal objects. Even ductwork and tanks. You can now spray thick seamless protection onto ordinary metals to fit them for severest service.

COLD DIPPING—3 TIMES FASTER

Unichrome Coating 4129 solves the problem of economical dipping of wire goods. It permits dipping at room temperature . . . 3 times faster than previous cold dip compounds, and using only half as much plastisol material. Refrigerator shelves, freezer baskets and the like are now getting the better protection of plastisols more economically.

In these two singled-out examples, you see what Metal & Thermit strives to do with all its metallic finishes, organic coatings, dip finishes . . . to help you cut finishing production cost, or produce a superior product through a better finish. We'd welcome an opportunity to work with you.

PLATING MATERIALS
ORGANIC COATINGS
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make every move count!

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Overhead Traveling CRANES and HOISTS

Quick, dependable movement of stock whenever and wherever needed is a "must" in steel warehousing. Breakdowns, idle time for maintenance and similar stoppages cannot be tolerated.

During the past fifty years NORTHERN OVERHEAD ELECTRIC TRAVELING CRANES have been installed in many warehouses where they are providing fast, continuous, uninterrupted service — meeting peak load demands—dependably responding to rugged overloading in emergencies—making every move count for better service to suppliers and their customers.

Write for Bulletin 150-C

NORTHERN ENGINEERING WORKS

General Offices: 210 CHENE ST., DETROIT 7, MICHIGAN

BUILDERS OF CRANES AND HOISTS EXCLUSIVELY

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
MARCH 3, 1956	144,121	27,653
FEB. 25, 1956	131,966	24,278
MARCH 5, 1955	176,180	16,712
FEB. 26, 1955	179,406	15,673

*Estimated. Source: *Ward's Reports*

April but are coming back strong in May and June. The amount of steel turned down so far this year is a little more than 2 pct of total U. S. production.

Thus, other industries are still hard pressed to get all the steel they want. Once the mid-year mark is passed, the auto industry is going to start buying for 1957 models. This means that, barring a strike, the mills will be rolling merrily along while purchasing agents tear their hair in efforts to keep the assembly lines moving.

New V-8:

American Motors Gets Set to Produce Own.

American Motors Corp. new V-8 engine, which will go into production sometime in May, will be installed on five new models which the company is adding to its line of Hudson and Nash cars.

Although there are no plans at the present to install the engine in AMC's popular little Rambler, it will be done at some time in the future.

The new engine, which took 4 years to develop and cost $11 million, is rated currently at 190 hp and has a displacement of 250 cu in. Its compression ratio is 8 to 1.

Can Go Higher

All the basic components of the engine such as the crankshaft, valve size and block have been designed for about a 300 hp capacity.

The potential of the engine is one of the factors which influenced its design, according to Meade F. Moore, vice-president in charge of engineering and research.

The engine will be produced on a new engine line at the company's Kenosha, Wis., plant. It has not yet been definitely established just what the capacity will be but, like all new developments, production will be limited at first.

Since the merger of Nash and Hudson, American Motors has been buying V-8 engines from Packard. The arrangement was an expedient measure to give AMC time to develop its own V-8 powerplant.

However, the company will continue to buy Packard engines at least through the end of the 1956 model run. The Packard V-8 is rated at 220 hp on the Nash and Hudson cars.

Broaden Market

American Motors is not prepared to comment at this time on the new models which the company will introduce with the engine. However, insiders believe that AMC is following closely the formula for growth which has proven so successful in other segments of the industry.

George Romney, AMC president, says that the Rambler is the company's basic volume car. It is also the unit on which AMC is virtually pinning its hopes for survival.

But it is believed that the new models will be an attempt to give the company a broader coverage of the market. In other words, American Motors is following the old line of making a car with a price for every purse.

Station Wagons Only

The increasing popularity of the station wagon has resulted in the start of construction of a plant specifically devoted to making station wagon bodies by the Mercury Div. of Ford Motor Co.

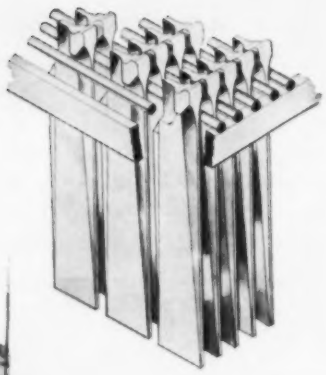
Mercury reports that it has taken the step because its station wagon sales have increased 760 pct since 1947.

The new plant which is located next to the regular Mercury assembly plant in Wayne, Mich., will contain 352,000 sq ft and will go into production late this year on 1957 models.

The plant will contain complete body, paint and trim facilities and the finished bodies will be shipped to plants at Metuchen, N. J., St. Louis and Los Angeles.

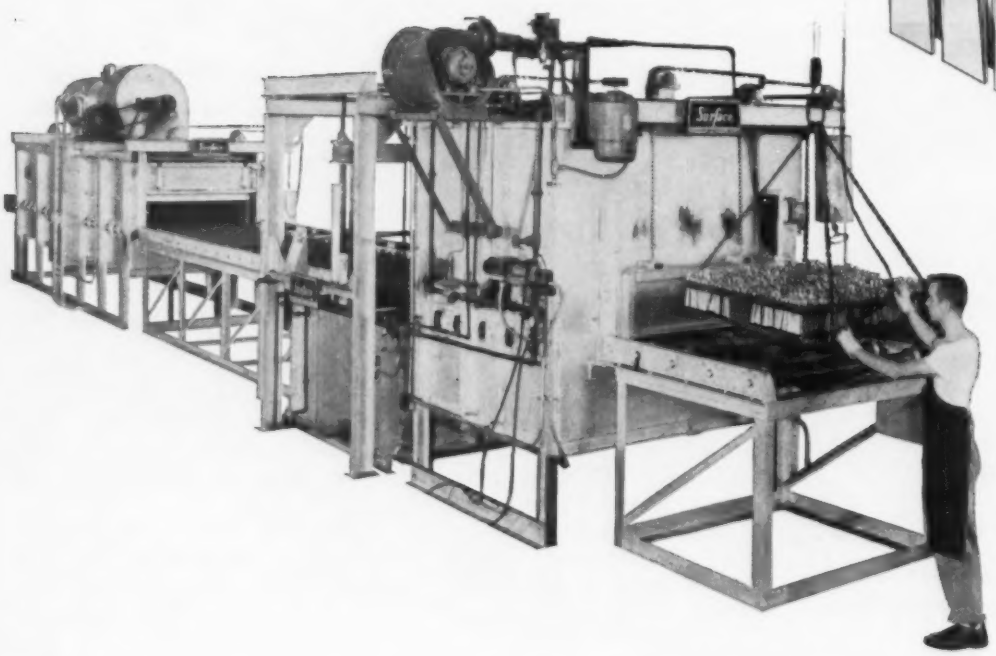
THE BULL OF THE WOODS — **By J. R. Williams**

HANDLES! EVERYTHING, FROM A BABY'S RATTLE TO A THROTTLE OFF A LOCOMOTIVE! WHO'S THE COLLECTOR?
THAT'S TH' BOSS'S LIFE STORY, AND TH' ROUTE TO HIS OFFICE-- HIS DOORKNOBS IS BRASS OUTSIDE AN' GOLD INSIDE!
PRESIDENT
"THE MAKINS"
J.R.WILLIAMS
3-7



The fixturing—250 aluminum parts/sq. ft.—for high production heat treatment of 14S aluminum.

Operating cycle: (1) heat to 940°F in 1¼ hrs., (2) soak ½ hr., (3) fast quench, (4) run-out, (5) heat to 340°F in 1 hr., (6) soak at 340°F for 9 hrs., (7) unload.



Thousands of aluminum parts a day...

are solution heat treated and aged in this 'Surface' continuous furnace line at the Martin Parry Corporation, Toledo. High production (1875 lbs. net every 10 hours) is achieved by a high rate of heat transfer, ingenious fixturing which assures thousands of evenly-heated parts per load, and mechanized work-handling. Uniform mechanical properties in the finished 14S parts result from uniform temperatures throughout each load.

The solution heat treating furnace is heated by three radiant tubes which isolate the products of combustion from the work. A high-speed fan provides efficient forced convection heating. After a fast water quench, the work enters the aging furnace, which has a direct-fired air heater, and a blower. No special atmosphere is required in either furnace. Capacities and cycle times of the two furnaces are balanced to provide smooth, continuous production.

This modern line is only one out of hundreds of installations built by 'Surface' for *heat processing light metals*—from ingot to finished product.

Write today for our new bulletin 171. It contains a world of information on the heat treatment of aluminum.

Surface
HEAT TREATING EQUIPMENT

SURFACE COMBUSTION CORPORATION, TOLEDO 1, OHIO
Also makers of Janitrol automatic space heating and Kathabar humidity conditioning units

THIS WEEK IN WASHINGTON

Is the Cold War Coming to a Close?

No, say mobilization men . . . Present stalemate may drag on for 40 years . . . They warn against easing defense effort . . . Planning alone will cost $500,000 a year—By G. H. Baker.

◆ GOVERNMENT'S top mobilization expert says we can expect the high pressure stalemate between the Free World and Communism to last "30 to 40 years." There's no use in kidding ourselves that the cold war will blow over any time soon.

To keep pace with Communist advances in mobilization strategy, the U. S. should continue to spend not less than half a million dollars annually just to keep its war plans up to par, Defense Mobilizer Arthur S. Fleming tells Congress.

(The big defense money is, of course, the $35-plus billion paid out by the Defense Dept.)

ODM currently has three plans for U. S. mobilization:

General mobilization without an attack on continental U. S. There is a tendency to overlook this plan, Dr. Flemming states.

General mobilization due to a pending attack on the U. S.

Immediate general mobilization due to an attack on the U. S.

Russia now has the capability to attack continental U. S., says Mr. Flemming, and this capability will improve as time goes on.

Rays Can Hurt . . . What metalworking firms should know about their legal liability for radiation hazards is being unfolded in Washington by a group of atomic experts.

As more and more firms join the growing list of contractors licensed to engage in atomic energy activities, the dangers of employee injuries resulting from excess radiation are increased proportionately even considering safeguards.

The legal staffs of steel and metalworking firms have much to learn about their liability in suits growing out of radiation injuries. That's where the new Washington study group takes over. It will provide the answers.

Spell Out Rights . . . All labor contracts with firms engaged in atomic pursuits will in the future spell out employee rights and employer responsibility with respect to radiation hazards. If a casting or forging worker, for example, gets a large dose of radiation, is the company to blame? Or, is the government—as the supplier of all atomic fuel—to blame? Is the worker at fault?

Courts will have to decide each case on its merits, but the time for companies to brush up on their own rights and obligations is now. A series of round-table studies, sponsored by the Atomic Law Institute (Willard Hotel, Washington, D. C.) will begin on March 5 to provide the answers.

No Tax Relief . . . Retention of the 52 pct corporation rate and excise taxes at their existing rates is virtually assured. The powerful House Ways and Means Committee is supporting extension of present rates.

Corporation rate has been scheduled to drop to 47 pct for several years, but Congress each year extends the high rate for another 12 months to prevent loss of revenue. Excises slated to drop, also on April 1, but continued, include such consumer items as liquor, beer and cigarettes.

House Will Act . . . Next step for the tax extension measure will

Why Business Cheers Ike's Decision

▪ To businessmen, four more years of Ike in the White House will mean:

▪ Defense spending will stay high, and will tend to creep up still higher due to the high cost of late-model weapons.
▪ Tax reduction still is not in sight, but continued prosperity brightens the possibility of cuts later this year or early next year.
▪ The government will resist moves to impose controls over metals, scarce materials, prices, wages, rents, or consumer credit.
▪ Foreign aid will rise. Ike wants to double the present rate of $2.5 billion a year in handouts, and now he'll probably get an okay from Congress for the entire $5 billion.
▪ Reciprocal trade is here to stay, along with still lower U. S. tariffs.
▪ Anti trust activity, hottest in 30 years, will continue the slam-bang pace of the past three years.

see them in action Booth 100

ASTE SHOW, CHICAGO AMPHITHEATER, MARCH 19-23

now Cincinnati does both!

fh is the bright symbol for **flamatic hardening,** the flame hardening process with electronic control. Cincinnati now presents a new machine for **induction hardening,** and a new symbol: **ih**

Its family name tells you that it represents years of experience, yet it will bring exciting new concepts to heat treating. See it, in action, at the ASTE Show, Booth 100, or write for Catalog No. M-1938.

CINCINNATI **THE CINCINNATI MILLING MACHINE COMPANY,** Cincinnati 9, Ohio
Process Machinery Division

be the House floor, where a host of amendments are waiting—most of them to aid small business.

Efforts will probably be made to tack a provision on the bill reversing the present corporate base and surtax rates of 30 pct and 22 pct, respectively, so that corporations would pay a tax of 22 pct on the first $50,000 or $100,000 (instead of $25,000 as at present) and a 30 pct surtax on earnings over that.

This would cost the government several hundred million dollars in revenue, but would help small firms get started and expanded. Democratic sponsors of the measure claim.

Union Politics

The U. S. Supreme Court has been asked to rule on the propriety of spending union dues to elect political candidates.

Federal Judge Frank A. Picard ruled in a Detroit court Feb. 3 that the United Auto Workers (AFL-CIO) did not violate any law when it spent money collected in union dues to pay for TV commercials plugging Democrats for Congress.

But U. S. District Attorney Fred W. Kaess, of Detroit, says Judge Picard is in error, and he wants the Supreme Court to look into the matter.

Strike:

Supreme Court okays walkouts in cooling-off period.

Workers may strike against unfair labor practices without waiting for the 60-day "cooling-off" period required by the Taft-Hartley Law for economic disputes, the U. S. Supreme Court rules.

The cooling-off requirement, the court says in a 6-3 decision, applies to strikes under regular collective bargaining, but not to protests over unfair labor practices. Similarly, the court says, no-strike clauses in labor-management contracts do not bar protest walkouts for unfair practices.

Uphold Earlier Ruling

Taft-Hartley Act requires a labor-management contract to remain in effect 60 days without a strike or lockout after either party gives notice of a desire to negotiate a change. A worker who violates the 60-day provision loses his status as an employee.

The high court's decision upholds the National Labor Relations Board which had earlier ruled against Mastro Plastics Corp., and French-American Reeds Mfg. Co., Inc., that the cooling-off provision and a no-strike contract agreement did not constitute a waiver of employees' right to strike in protest to unfair labor practices.

Freight Lines Gain

Expanded manufacturing output is enabling surface carriers of property to record large revenue gains, but passenger business is lagging, says government statistics.

Railroads, highway freight lines, waterways, and the Railway Express Agency all registered increases in revenue in 1955, as compared with 1954, preliminary estimates by the Interstate Commerce Commission reveal. At the same time, there was a decline in returns to Pullman Co. and bus lines.

Combined revenues of the carriers under ICC authority amounted to more than $17.9 billion last year, exceeding 1954 figures by nearly $1.6 billion, or 9.5 pct. Largest share of revenues went to the rail lines, which increased their gross income by 7.8 pct to $10.4 billion.

Freight truckers' returns aggregated $5.4 billion for an increase of 14.8 pct. Water lines had the largest percentage rise, 16.1 pct, with 1955 revenues of $411.3 million. Oil pipelines boosted revenues 8.9 pct to a total of $672.2 million. Railway Express Agency made a gain of 0.9 pct and had a gross return of $237.2 million.

Halt:

CAA sets standards for runway arresting gear.

Civil airports have been given new details by the Civil Aeronautics Administration on approved standards for arresting gear installed on runways handling military air traffic.

Both chain-type arresting gears and barriers consisting of webbing and cable have been approved by the CAA. This equipment is not deemed necessary for civil operations, however, and is to be installed in overrun areas (runway extensions) wherever possible. When installed within runway limits, the equipment must lie flat if not in use.

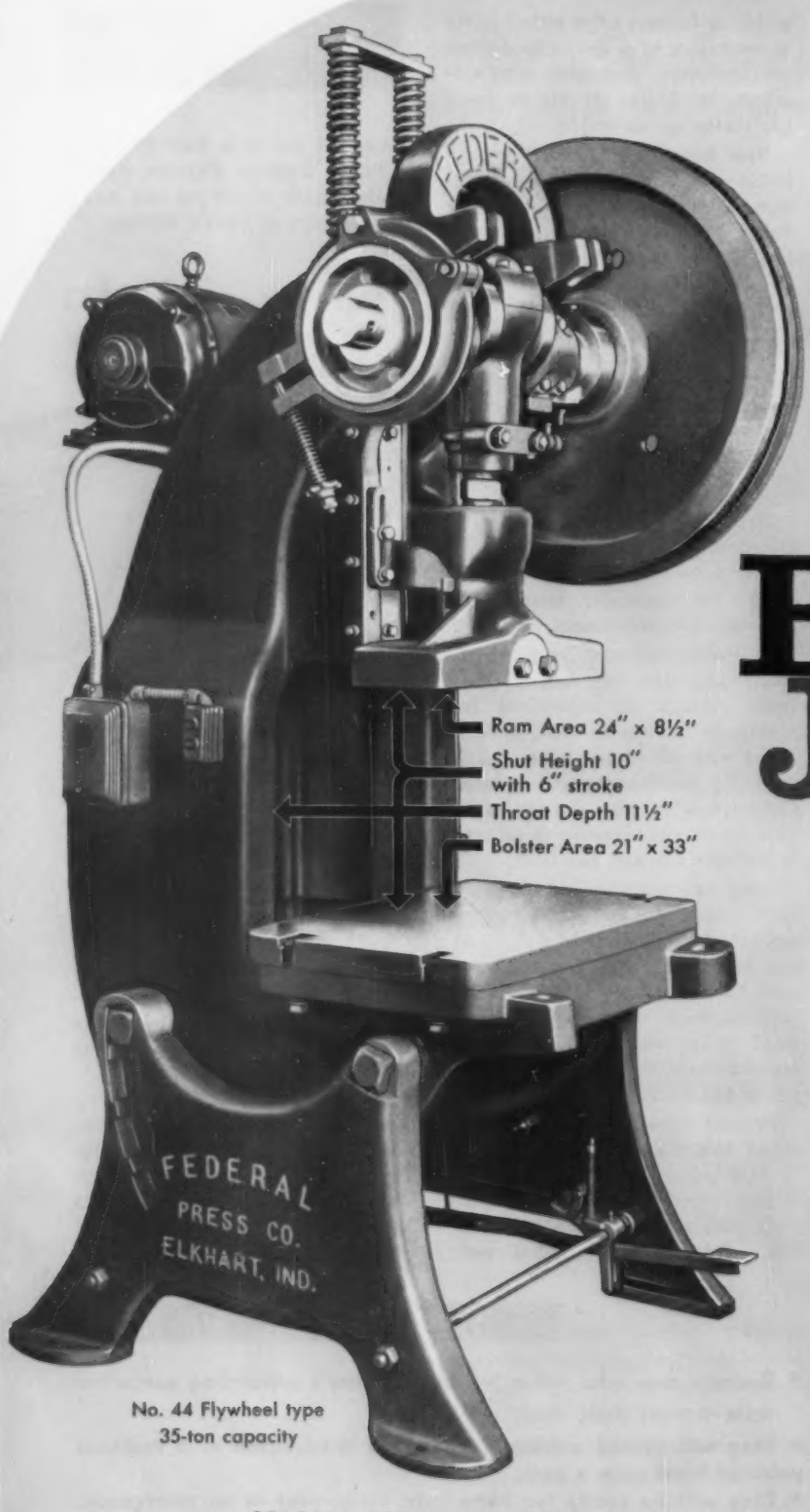
Use Nylon Web

Chain-type arresting gear follows the Navy design, with a cable mounted six in. off the paving and attached at each end to lengths of anchor chain. A landing aircraft engages the cable by means of a hook and is slowed as the heavy chain is dragged along.

The Air Force has an arresting barrier, part of which is nylon webbing, that is raised to about 39 in. A plane meeting the webbing actuates a cable that makes contact with the landing gear and slows the plane.

If You Sign Up with U. S.—

- Business men who enter the government's expanding executive reserve must state that:
- **They will attend a training course in Washington or a regional point at least once a year.**
- **They will be ready for immediate assignment in an emergency.**
- **Their employers agree they are available.**
- **They will keep the agencies to which their units are assigned informed of any personal or business status changes which would hinder wartime service.**



No. 44 Flywheel type
35-ton capacity

For economical handling of....

BIG JOBS

You can't beat the FEDERAL #33 and #44 with "oversize" dimensions

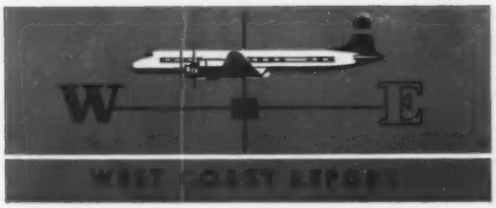
Don't let light, bulky work tie up your big, costly equipment. These FEDERAL PRESSES are expressly designed to handle cumbersome jobs—such as die-cast trimming, laminations, progressive die work. *Just note the generous dimensions!* The #33 and #44 also give you *extra quality* features—plus quality materials and workmanship that have made FEDERALS famous. Available in geared or flywheel types with or without air clutch and electro-pneumatic controls for high-speed operation. WRITE FOR NEW CATALOG showing complete line.

No. 33 Press—26-ton—with following important dimensions: Ram Area: 18" x 7½" • Shut Height: 9½" with 2½" stroke • Throat Depth: 8¾" • Bolster Area: 16" x 32".

FEDERAL PRESS COMPANY, 602 Division Street, Elkhart, Indiana

FEDERAL *Open back Inclinable* PRESSES

31 YEARS OF QUALITY CONSTRUCTION



Plan Second Fully Integrated Steel Mill

Long-range U.S. Steel planning calls for fully integrated steel mill in Bay area . . . Second such installation on the Coast . . . More headaches for shipyard owners shaping up—By *R. R. Kay.*

◆ THE WORD is out. There's another fully integrated steel mill, second on the Coast, on the way.

Earlier hints and rumors of such a development are now official. Alden G. Roach, president, Columbia-Geneva Steel Div. of U. S. Steel Corp., says: "Long-range planning is for an integrated mill some day" in the San Francisco Bay Area. How soon?

Here Are Some Specifics . . . Mr. Roach says he put in a bid for such an expansion several years ago, but was turned down on the proposal at the time. Primary reason was that money wasn't available for an integrated steel mill. He says it may be 5 or 10 years from now.

But it's a good bet the integrated setup will come lots sooner. Why? The Farwest market is busting out all over, and the mills can't keep up with it. Although they're operating at over-capacity rates, there's still a giant gap between production and demand.

Other Data . . . When U. S. Steel decides the time is ripe, it will add a blast furnace operation to its Pittsburg, Calif., works. It's estimated that the cost to fully integrate will come to around $30 million. The company bought 600 adjacent acres here a year ago.

Where's the ore to come from? Pittsburg's deep-water docks can handle shipments from diggings in Venezuela and Brazil. And, closer to home, the company has exploration projects going in British Columbia and the Yukon.

Also, U. S. Steel staked out some 120 claims in southern California. The 1700 acres are adjacent to Eagle Mountain Mine, Kaiser Steel Corp.'s major iron ore source.

Waterfront Beat . . . West Coast shipyards, struggling to keep their heads above water, may have a labor fight on their hands. Seattle unions are planning a 40-point request for substantial wage boosts, a seven-hour day, bigger overtime pay, and better working conditions.

Shipyard owners are worried the pay increases would slow down already depressed yards.

Look for the Seattle unions to try to sell their program to the Pacific Coast District Metal Trades Council convention in Bellingham, Wash., May 22.

Notes From Here and There . . . High cost of air pollution will get higher as your city gets bigger.

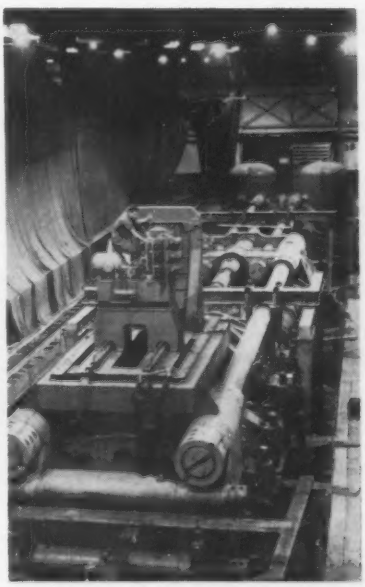
Los Angeles Basin's industry last year added some $50 million in new basic production equipment—poured nearly $10 million more into smog control equipment. In 1954, basic outlay was $40 million—control equipment, over $7 million.

Good housekeeping pays off! A major aircraft plant picks $400 a day off its floors. It's all in metal: nuts, bolts, clecos, screws, and other pieces of hardware.

Expensive clecos, $2000 worth a month, are put back in use. Rest goes for scrap at about $1 a lb.

Heavy Press

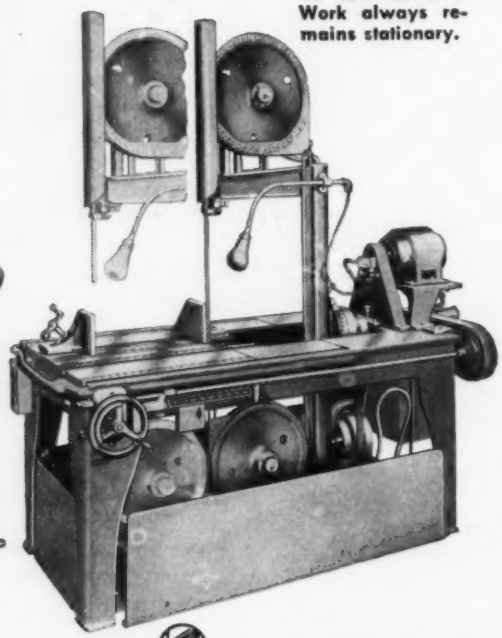
◆ WEST'S first press installation under the U. S. Air Force heavy press program reaches final assembly stage at the Harvey Aluminum plant in Torrance, Calif. Harvey will produce large, one-piece airframe shapes on the press, replacing conventional fabricating methods of riveting, welding and bolting many small components. Press is an 8000-ton capacity extrusion press. Meanwhile, a companion 12,000-ton press is also being installed at Harvey Aluminum. Dimensions of the first press are: overall length, 288 ft; height, 20 ft; width, 21 ft, and weight, 4 million lb, among largest of its type.



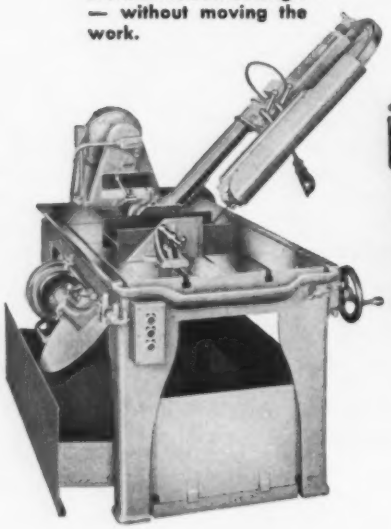
Never Confuse the No. 8 MARVEL with an ordinary Band Saw

...only the MARVEL is Universal

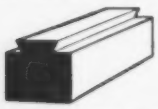
Only on a MARVEL No. 8 does the blade remain at a right angle throughout its full 18" feed traverse. Work always remains stationary.



Only on a No. 8 MARVEL can the saw column be instantly indexed and locked at any angle from 45° right to 45° left, and the saw then fed thru the work at the desired angle — without moving the work.



Only a No. 8 MARVEL can do all of these things: Snip-off a ⅛" rod or cut-off an 18" x 18" cross section



Rough to Size and Shape

Miter

Index

cut off and shape Structural Beams.

Only a No. 8 MARVEL has the large T-slotted work table, with removable quick action vise, that permits accurate set-ups of work of unrestricted sizes and shapes, special fixtures; Etc.

"Rough Machine" to size and shape with minimun chip waste

The No. 8 MARVEL is the "busiest tool in the shop" wherever installed because it is a *universal* tool—has both the capacity and the versatility to handle not only standard sawing jobs but innumerable "trick" and convenience jobs as well. More than a metal saw, the No. 8 MARVEL is a fine machine tool with machine tool features like: Both power and hand feeds; Depth Stops; Automatic Blade Tension; Built-in Coolant Pump; Three operating speeds (or six with 2-speed motor). Moisture-proof electrical controls that conform to both "J.I.C." and "MACHINE TOOL" electrical standards; Dirt-proof ball bearings, etc.

If you cut, machine or fabricate metal, this is a sawing machine you should know about. Write for catalog.

MARVEL *Metal Cutting* SAWS

Better Machines–Better Blades

ARMSTRONG-BLUM MFG. CO. • 5700 West Bloomingdale Avenue • Chicago 39, U.S.A.

Are Builder's Gains All on Paper?

New orders cheer machine tool men . . . But lagging shipments cut cash returns . . . Companies push hard to catch up with demand . . . No letup in sight as auto picture looks bright—By *E. J. Egan, Jr.*

◆ "MACHINE tool industry's biggest job right now is to boost its shipment rate. New orders are one thing, but shipments that can be billed and collected on really tell the story at the end of a business year." So says Tell Berna, executive vice president, National Machine Tool Builders' Assn.

Minutes away from the Association's Cleveland headquarters, two of the industry's most prominent firms are going all out to narrow the time lag between an order and a finished machine.

The National Acme Co., after proudly unveiling its new 8-spindle Acme-Ryder vertical chucking automatic last week, took trade press editors on a tour of the plant assembly area. There stood dozens of bar and chucking automatics, in final test stages, and all within days or hours of shipment to U. S. and Canadian destinations.

Carry Customer Tags . . . Interesting things to note were the customer identification tags affixed to the machines. Most were stamped with the names of major producers of automobiles and parts. Questioning brought out the information that about 60 pct of National Acme's business comes from the automotive area.

The firm's general sales manager, Robert R. Rhodehamel, sees good clear weather ahead.

"The automobile manufacturers are trying to take the humps out of car floors," he says. "This means new driveshaft and axle assemblies that will require different and maybe more parts than present designs. Many of these parts will be of a type that can best be produced on machine tools such as we make."

They Push Too . . . A few miles across town, The Warner & Swasey Co. is also working night and day to keep up with an increasing demand for its metal turning machines and tooling accessories. A company official predicts that "1956 will be 25 pct better than 1955 as far as our business is concerned."

Interesting fact here is that W & S expects its future business to come from a wide segment of the metalworking industry. The firm is bearing down heavily on the quick setup change features of its machines for small to medium lot production.

What They Do . . . To boost its shipping rate, Warner & Swasey is installing more and more time-saving equipment. Items range from huge precision boring machines and fixtures to ultra-fast heat treating setups for distortion-free hardening of critical lathe components.

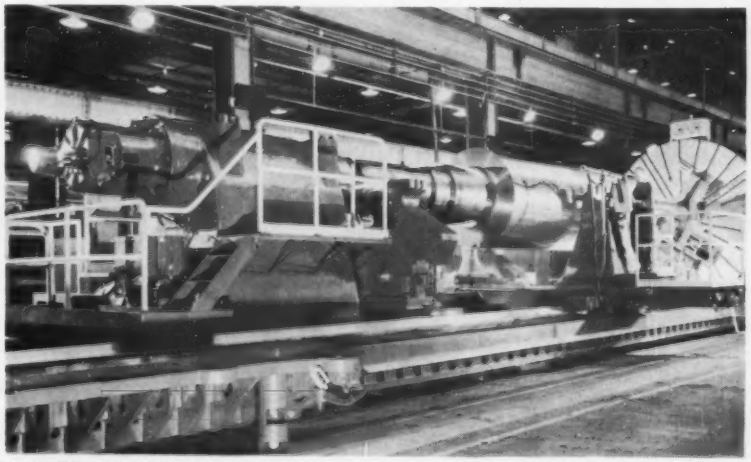
Along with the rush to get current orders made up and shipped, both firms have design teams working toward the goal of even better machine tools.

For example, Warner & Swasey engineers won't predict what their units will look like five years from now. But there's a better than strong possibility that ceramic cutting tools will have some influence on "new look" equipment in the 1960 Machine Tool Show.

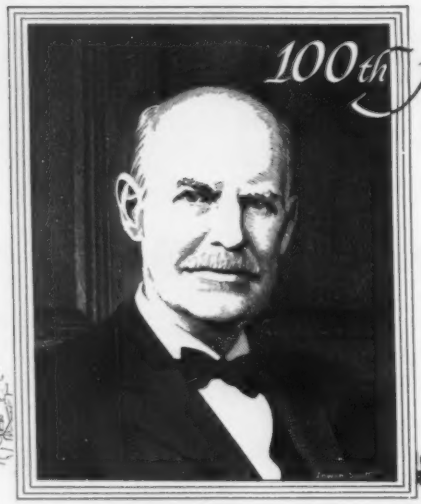
Gear Index, 1956

January	245.5

(1947-49=100)

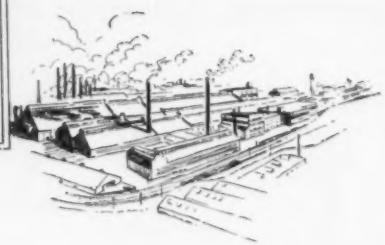


LARGER MACHINE TOOLS like this 144-in. engine lathe at Allis Chalmers Co. are required to machine giant size equipment for the electricity industry.



100th Anniversary

INVENTOR
SCIENTIST
INDUSTRIALIST



this was genius . . .

EDWARD GOODRICH ACHESON

Yes, this was genius.

Thomas A. Edison knew it. In paying tribute upon the occasion of Doctor Acheson's passing, he said "... as a former associate I know the world loses a great genius."

Leo Hendrik Baekeland knew it. He remembered him "as a man who combined a most fertile brain with great strength of conviction."

Walter B. Pitkin knew it. This famous psychologist said "As he created his place in our civilization so does that place pass with him. None shall fill it."

And the press knew it. They used in their editorials such phrases as "world's acclaim of a genius," "one of the geniuses of his time," and "the loss of an inventive genius."

But what makes genius?

Employing a mixture of carbon, sand, salt, and sawdust in a simple but effective electric furnace, made up of a few strands of wire, a carbon rod, and a plumber's bowl, Edward Goodrich Acheson was able to bring into being a mass of scintillating crystals rivaling many gems in splendor and almost matching the diamond in hardness. These highly abrasive crystals he crushed and made into grinding wheels, and these wheels, in turn, were used to shape metals and make machines. Called "Carborundum" by Acheson and silicon carbide by the chemist, this new material did its job so well that it is credited with making possible today the mass production of automobiles, tractors, and countless other mechanisms.

Possibly silicon carbide could be made better—harder or sharper. To this end Acheson subjected silicon carbide to higher temperatures for longer periods; what he obtained was not a harder substance but, instead, one of the softest—pure graphite. The extreme conditions to which he had exposed his jewels of industry brought about their disintegration, the silicon passing off as vapor and the carbon remaining as a soft, unctuous residue. Manufactured graphite, destined to be of far-reaching importance, became another of Acheson's contributions to industry.

Unquenchable curiosity, coupled with the indomitable spirit that was his, led him to uncover means of preparing this new product of the electric furnace in the form of plates and cylinders. Put to work as electrodes, these soon revolutionized electrochemical and electrometallurgical operations. Acheson had now made commercially feasible the production of new families of chemicals and laid the groundwork for the present efficient manufacture of steel and alloys.

During Acheson's painstaking efforts to produce graphite crucibles he experimented with many clays for use as binding agents—and he learned much about them—so much in fact that he was able to explain why the ancient Egyptians used straw in their brick making and what caused the formation of the deltas of the Nile and Mississippi. Most important, he discovered a method of rendering graphite colloidal.

Colloidal graphite in modern industry plays a role that is varied and complex, its unique properties finding utility in such dissimilar fields as lubrication, electronics, metalworking, and lithography, to name a few. The techniques originated by Acheson for colloidally dispersing graphite are being applied to other solids including carbon blacks, pigments, and minerals.

To those of us in the companies identified with Doctor Acheson, his perseverance and achievement are an inspiration. We are proud to offer this tribute to his genius on the 100th anniversary of his birth.

Acheson Industries, Inc.

ACHESON COLLOIDS COMPANY
PORT HURON, MICH.

ACHESON DISPERSED PIGMENTS CO.
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GREDAG, INC.
NIAGARA FALLS, N.Y.

ACHESON COLLOIDS LIMITED
LONDON, ENGLAND

The Iron Age

SALUTES

Howard C. McMillen

He helped convert industry from civilian to wartime production.

He did a big retooling job in the move back to peace. He has shown the ability to build new production from the ground up.

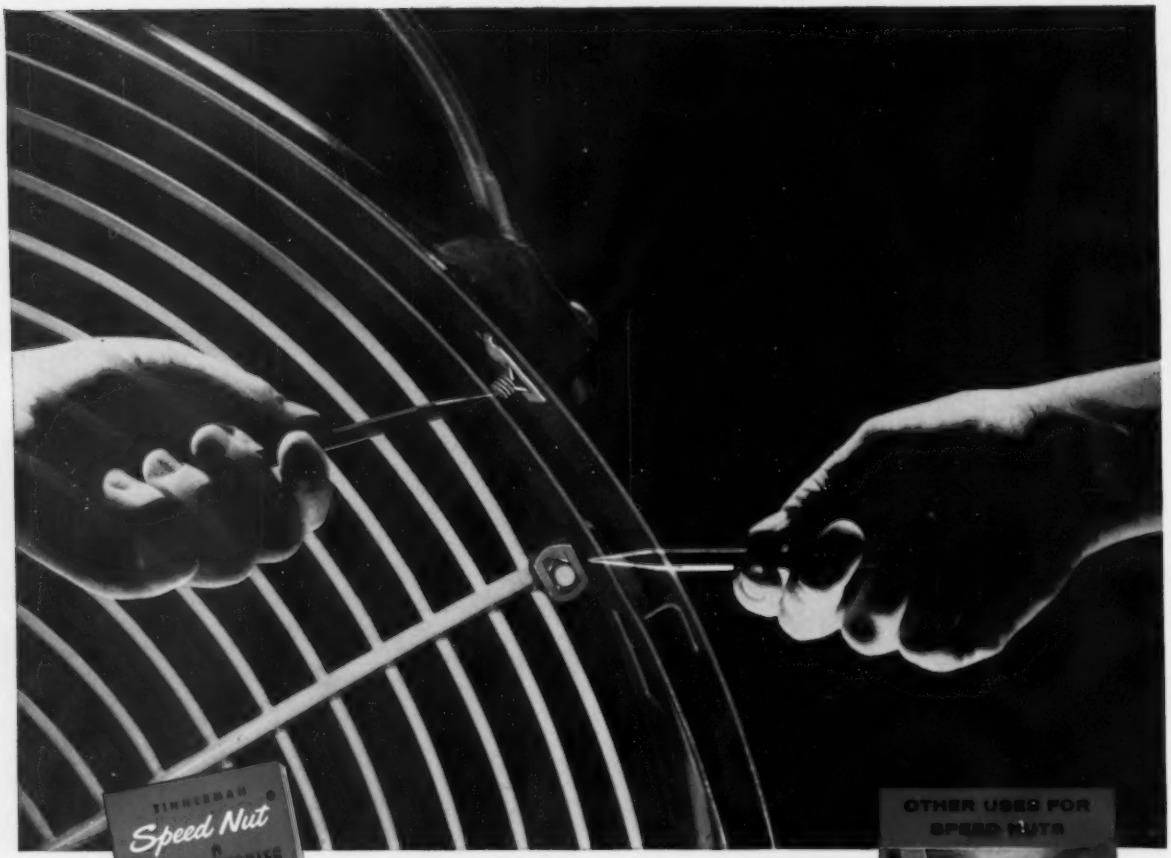
During the early part of World War II, Howard McMillen was tool and gage supervisor with General Motors' Aeroproducts Div. Production of a new variable pitch propeller was being held up because the special forming presses needed weren't available. Mr. McMillen sold management on the idea of picking up some used tire-making presses in Akron. They worked fine. Production began rolling.

Now plant manager of Philco Corporation's Bedford, Ind., plant and in line for the presidency of American Society of Tool Engineers, Howard McMillen has a name for coming up with the right tools for big jobs. After the war, he moved to Seeger Refrigerator Co. as superintendent of production engineering. Charged with retooling the plant for refrigeration production, he plunged into the job, got it done, and was made general superintendent.

He left Seeger in 1951 to become plant manager at Bedford. Here, he put the new plant into production, hiring department heads, laying out and equipping the operation. His genius for retooling carried over into civic work where, as a member of the county council, he streamlined elections by authorizing the buying of voting machines.

Outside his own companies, Mr. McMillen has an equally impressive record of service. He joined ASTE in 1938, served in local offices until 1949, moved into national work at that time as chairman of the national finance committee. He has held a succession of important posts in the national organization, figures to step into the presidency from his current post as first vice president. The honor is richly deserved.

Mr. McMillen is a trustee of his church, chairman of the industrial committee of the Bedford Chamber of Commerce, has just been appointed to the personnel and labor relations committee of the Indiana State Chamber of Commerce. Mrs. McMillen is equally civic minded, serving as a substitute school teacher and putting in considerable time on church and related work. Both McMillen sons have gone to their father's school, Purdue, for engineering studies.



37% cost saving in production, 28% saving on assembly with Tinnerman SPEED NUTS®!

It takes only 5 Tinnerman SPEED NUTS to cut costs on the Atlas-Aire Utility Fan, manufactured by the Atlas Tool and Manufacturing Company, St. Louis.

Two "J" Type SPEED NUTS make a lightning-fast, vibrationproof attachment of carrying handle to fan housing. Three Push-On SPEED NUTS firmly secure the grill to the housing.

Twelve parts were eliminated to bring about a 37% cost saving; total assembly time has been reduced from 25 to 18 minutes to effect a 28% time saving. The elimination of a spot welding operation and a punch press also resulted in a better use of over 400 square feet of floor space!

Your Tinnerman representative can offer you over 8,000 different shapes and sizes of SPEED NUT brand fasteners to produce similar fastening savings in your product assemblies. Call him, or write for your free copy of "SPEED NUT Savings Stories."

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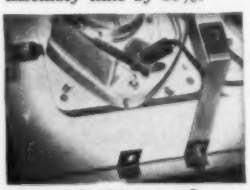
Canada: Dominion Fasteners, Limited, Hamilton, Ontario. *Great Britain:* Simmonds Aerocessories, Limited, Treforest, Wales. *France:* Aerocessoires Simmonds, S. A., 7 rue Henri Barbusse, Levallois (Seine). *Germany:* Hans Sickinger GmbH "MECANO", Lemgo-i-Lippe.

OTHER USES FOR SPEED NUTS

Jet-convector heater manufacturer uses "U" and "J" type SPEED NUTS, reduces assembly time by 50%.



"U" and "J" type SPEED NUTS designed into new gas range gain 50% assembly time saving.

On this ceiling light, special SPEED NUT replaces 3 parts, cuts assembly time by 80%!

TINNERMAN
Speed Nuts
FASTEST THING IN FASTENINGS®

The Iron Age INTRODUCES

ROBERT POTTER, elected president and chief administrative officer, E. W. Bliss Co., Canton, O.

HOWARD U. HERRICK, elected chairman of board, E. W. Bliss Co., Canton, O.

J. H. TREDINNICK, elected vice president and a consultant to president, E. W. Bliss Co., Canton, O.

A. K. RHEEM, elected president, Cowles Tool Co., Cleveland, O.

W. H. Rietz, elected president, **Ilg Electric Ventilating Co.,** Chicago.

Wilbur E. Kelley, elected president, **Walter Kidde Nuclear Laboratories, Inc.,** Garden, City, L. I.

Bruce Ballman, elected executive vice president and general manager, **Dahlstrom Machine Works, Inc.,** Chicago.

C. Foster Brown, Jr., elected executive vice president, production and sales, **Ceco Steel Products Corp.,** Chicago.

Paul F. Pape and **Charles DuBose,** elected vice presidents, **F. H. McGraw & Co.,** New York.

William F. Fritz, appointed plant superintendent, **The Boye & Emmes Machine Tool Co.,** Cincinnati.

D. R. Waugh, appointed assistant director, market development, **U. S. Steel Corp.,** New York.

Donald E. Malcolm, named supervisor, methods and standards, **Trailmobile, Inc.,** Cincinnati.

Robert A. Armstrong, elected to board of directors, **Michigan Seamless Tube Co.,** South Lyon, Mich.

John S. DeNoia, appointed automotive sales manager, **Permacel Tape Co.,** New Brunswick, N. J.

R. L. Bobo, named manager, regional plant, **Federal Pacific Electric Co.,** Cleveland, O.

Jack K. Sutter, appointed sales manager, standard pipe products, **The National Supply Co.,** Pittsburgh.

William Doonan, appointed midwestern sales manager, **Cleveland Instrument Co., Inc.,** Cleveland.

Charles Bueltman, appointed manager, Industrial Waste Treatment Dept., **The Permutit Co.,** New York.

Charles S. Bishara, appointed assistant to sales manager, **E. H. Titchener & Co.,** Binghamton, New York.

Samuel A. Leone, named manager, Conveyor Div., **The Colson Corp.,** Elyria, O.

Robert L. Chandler, appointed plant manager, **Square D. Co.,** Royal Oak Township, Mich.

J. Gibson Henderson, appointed manager, industries systems sales unit, Apparatus Sales Div., **General Electric Co.,** Schenectady, N. Y.

Merle P. Spurrell, appointed general sales manager, **Bulldog Electric Products Co.,** Detroit.

Harry L. Sturla, Jr., appointed manager, Market Research Dept., **Joseph T. Ryerson & Son, Inc.,** Chicago.

Donald E. Black, named sales training manager, **Acme Steel Co.,** Chicago.

Now, more than ever you can depend on

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as your best source for

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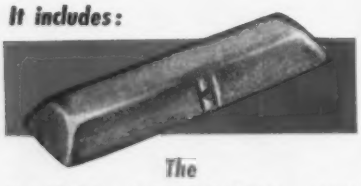
- Our merchant capacity is bigger than ever
- Our plant is better than ever
- Our product range is greater than ever

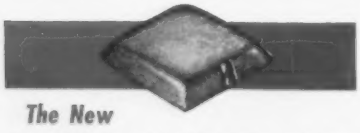
It includes:



The

HANNA 38-POUND PIG

The foundryman's favorite standard pig. Available in all grades, silvery and HannaTite. A good example of the quality that has made Hanna "the best known name in iron."



The New

EXCLUSIVE HANNATEN INGOT

For 10-lb.-pig users, this new ingot means no free-carbon pockets, finer grain structure, more even melting. Available in all grades, silvery and HannaTite — an extra-close-grain iron.

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NATIONAL STEEL CORPORATION

R. C. Brock, named general sales manager, **Joseph Dixon Crucible Co.,** Jersey City, N. J.; **David C. McMillin,** appointed assistant general sales manager, Jersey City; **A. G. Fletcher,** western district manager: **Harry I. Goecker,** appointed director, purchases; **E. M. Strom,** appointed assistant product manager, Graphite and Lubricants Div.

Harry Bishop, named general sales manager, Industrial Div., **The MacLean-Fogg Lock Nut Co.,** Chicago.

Kenneth Wilson, appointed manager, distributor sales, **American Welding and Manufacturing Co.,** Warren, O.

Richard L. Erlin, appointed general sales manager, fabricating division plants, **Kaiser Steel Corp.,** Napa and Fontana, Calif.

Grant H. Carpenter, appointed assistant to plant manager, Wire Rope Div., **Jones & Laughlin Steel Corp.,** Muncy, Pa.; **E. T. Evenden,** named chief service engineer; **W. H. Myers,** appointed metallurgist, Muncy plant.

Carl O. Hedner, appointed assistant general sales manager, Materials Handling Div., **The Yale & Towne Manufacturing Co.,** Philadelphia; **J. Russell Manning,** named manager, sales and service branch; **L. W. Goldenson,** named manager, San Francisco, sales and service branch, Materials Handling Div.

John A. Rinek, appointed general sales manager, **Heli-Coil Corp.,** Danbury, Conn.

William B. Burke, appointed sales manager, **Mell-Hoffmann Mfg. Co.,** Chicago.

Frank F. Black, named manager, Organic Chemical Dept., **Cowles Chemical Co.,** Cleveland.

W. C. Van Leuven, named midwest regional sales manager, Socket Screw Div., **The Bristol Co.,** Waterbury, Conn.

WILLIAM I. MATTHES, elected executive vice president, Arwood Precision Casting Corp., Brooklyn, N. Y.

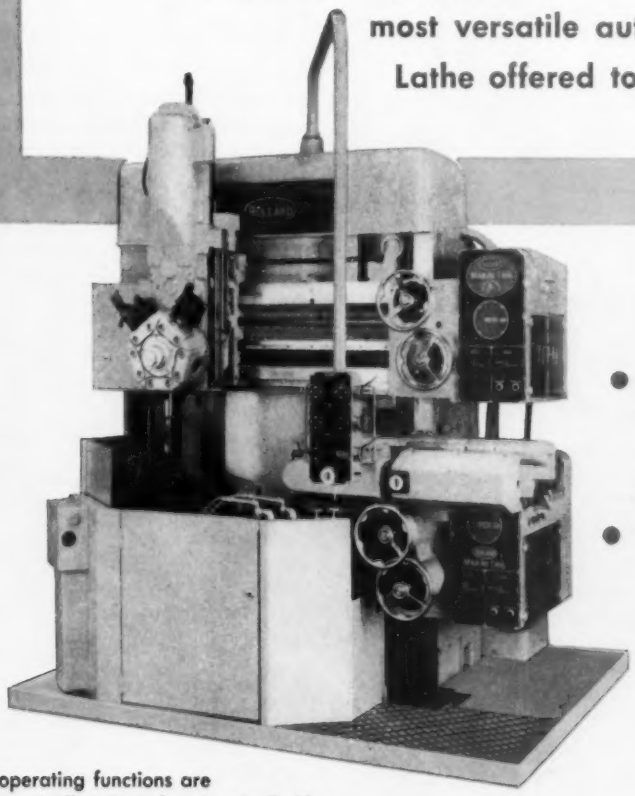
BERNARD DOLAN, elected vice president, Peter A. Frasse and Co., Inc., New York.

JOSEPH L. KNOPF, elected vice president, Morey Machinery Co., New York.

JAMES B. FISHER, named district manager, sales, Detroit, Superior Steel Corp., Carnegie, Pa.

don't BUY BULLARD *unless* YOU WANT THE BEST!

Yes, Bullard Cut Master, Model 75 with Man-Au-Trol Conversion Unit is the best . . . most versatile automatic Vertical Turret Lathe offered to industry today . . . . .



BULLARD

All operating functions are automatically initiated and controlled by one function control drum and two detector drums in Man-Au-Trol: Table Speeds (20 Available), Feeds (16 Available), Head Travel in feed or traverse, right or left, up or down or 45° in any quadrant and Turret Indexing.

Since the function control drum can be pre-set for a given job in advance, the machine down time for job change-over is reduced to a minimum.

The Man-Au-Trol Conversion Unit can be applied to any or all heads of Cut Master, Model 75 right in your plant.

Your Bullard Sales Engineer will be glad to explain the many other advantages offered by Man-Au-Trol — your best buy in an automatic vertical turret lathe — call him or write for our new catalog.

THE BULLARD COMPANY

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Please send me a copy of the
NEW MAN-AU-TROL, MODEL 75 CATALOG

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CITY_____ ZONE_____ STATE_____

now

you can get this brilliant finish directly on zinc die castings!

PART AS CAST

No electroplating--no mechanical finishing!

TREATED WITH NEW IRIDITE

NEW IRIDITE® (Cast-Zinc-Brite)

brightens zinc die castings by chemical polishing, protects against corrosion

NOW, FOR THE FIRST TIME you can get a brilliant, decorative finish directly on zinc die-cast parts . . . without mechanical finishing, without electroplating! The luster is provided by the *chemical polishing* action of new Iridite (Cast-Zinc-Brite) solution. Even surface blemishes, such as cold shuts, are brightened by this new process. No electrolysis. No special equipment. No specially trained personnel. Just a simple chemical dip for a few seconds and the job is done. And, this new Iridite has been *tested and proved* in production.

CORROSION RESISTANCE, TOO! New Iridite (Cast-Zinc-Brite) provides exceptional corrosion resistance for bright-type chromate finishes . . . also guards against blueing or darkening by eliminating zinc plate formerly required in bright chromate finishing of zinc die castings.

AS A BASE FOR ELECTROPLATING—Lower mechanical finishing costs are possible where plated finishes are *required* since the brightness provided by this new Iridite may be sufficient.

LET US SHOW YOU what Iridite (Cast-Zinc-Brite) can do for you. Send us at least a half-dozen typical zinc die-cast parts for FREE PROCESSING for your own tests and evaluation. Or, for immediate information, call in your Iridite Field Engineer. He's listed under "Plating Supplies" in your classified 'phone book. *IMPORTANT: when you give us samples for test processing, please be sure to identify the alloy used.*

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G. W. Dowsley, appointed assistant region manager, south-central district, **Parker Rust Proof Co.,** Detroit, Mich.

Harold N. Johnson, appointed service planning manager, Special Products Div., **Ford Motor Co.,** Dearborn, Mich.

Donald E. Parks, named product manager, American Kitchens Div., **AVCO Manufacturing Corp.,** Connersville, Ind.

Peter V. Schwab, named district manager, Pittsburgh, **Naresco Equipment Corp.,** Newton Heights, Mass.; **Ralph H. Vacca,** appointed manager, Electronics Development Section.

Thomas J. Quinn, appointed general sales manager, **Grobet File Co. of America, Inc.,** Carlstadt, N. J.

Richard M. McKenna, appointed district sales representative, Leschen Wire Rope Div., **H. K. Porter Co., Inc.,** St. Louis.

Zane H. Markley, named sales representative, **Kennametal, Inc.,** Denver, Colo.

Edward L. Baumann, appointed regional manager, New York, **The Bettinger Corp.,** Waltham, Mass.

OBITUARIES

F. F. Ward, vice president and sales manager, **Moltrup Steel Products Co.,** Beaver Falls, Pa.

Arthur G. McKee, 85, chairman, advisory board, **Arthur G. McKee Co.,** Cleveland.

O. Pomeroy Robinson, Jr., 64, senior vice president and director, **General Dynamics Corp.,** New London, Conn.

Benjamin C. Wells, 63, superintendent, blooming mills, **Republic Steel Corp.,** Canton, O.

Raymond L. Walsh, 65, retired assistant vice president and chief engineer, **Universal Atlas Cement Co.,** New York.

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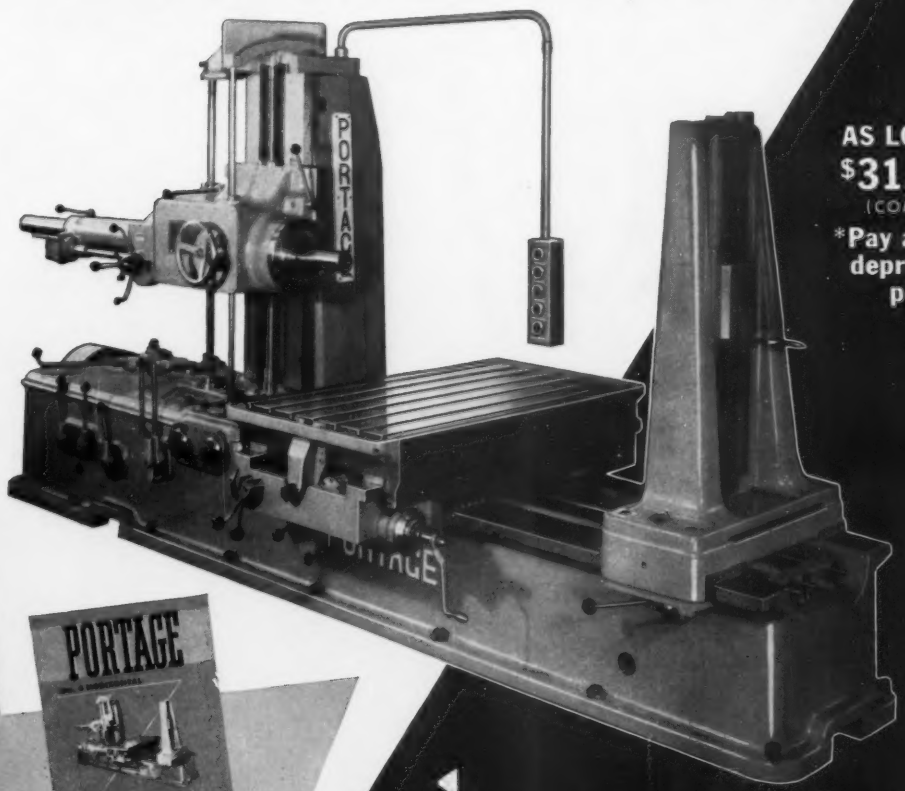
(4" Diameter Spindle)

Horizontal Boring, Drilling & Milling Machine

Outstanding . . .

MACHINE OF THE YEAR

Unsurpassed in Price and Quality



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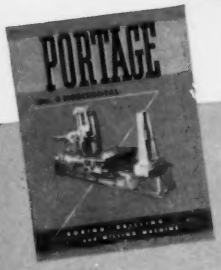
(COMPLETE)
***Pay as you depreciate plan**



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The PORTAGE Boring, Drilling & Milling Machine offers a *real* saving in new machine investment. PORTAGE mills cost from 5% to 20% *LESS* than present comparable makes . . . and the amazing part of this savings is the machine itself . . . Write today for literature covering all the specifications and features on the PORTAGE Mill.

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Representatives in Principal Cities

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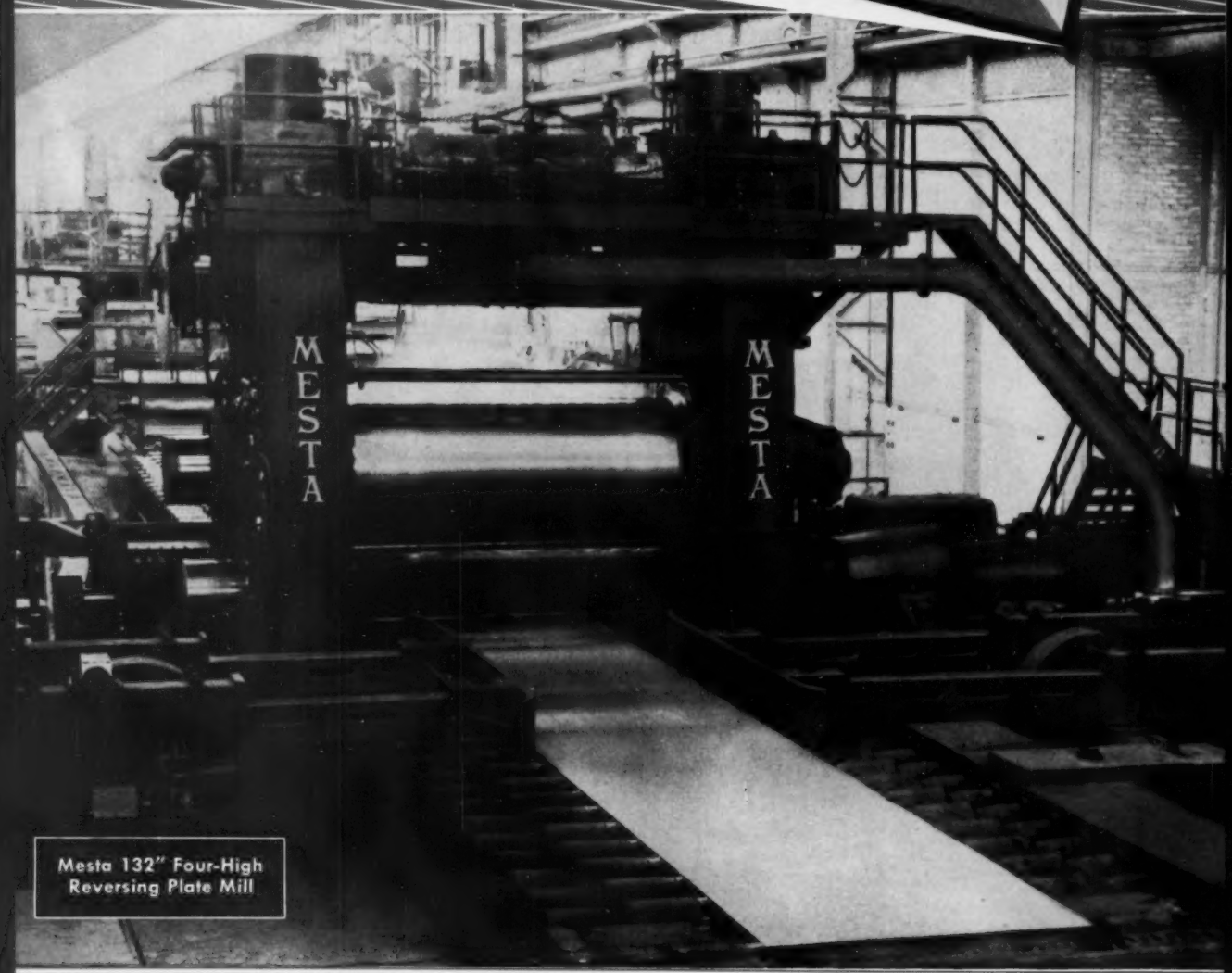
Designed and Built by MESTA



Mesta 132" Four-High Reversing Plate Mill

Designers and Builders of Complete Steel Plants

MESTA MACHINE COMPANY

PITTSBURGH, PENNSYLVANIA

THE IRON AGE | SPECIAL FEATURE

HOW TO GET MORE FOR YOUR METALWORKING DOLLAR

Number 2 of a series

TOOLING

COMPARABLE TOOL STEEL CHARTS

March 8, 1956

How To Get More For Your Tooling Dollar

Every manufacturing plant has many—probably hundreds—of opportunities to get more for each tooling dollar. But these opportunities are usually scattered throughout many areas of a plant's operations. The problem is to find them. Once found, it becomes a matter of making the most out of each opportunity.

In this feature you'll find the combined thinking of some of the top tooling experts on the subject. Their suggestions on where tooling savings can be made range from the fundamentals of part design to the actual selection of equipment and accessories. In every case an effort has been made to offer workable, cost-saving ideas to tool engineers, production men, purchasing agents—all those involved in the many phases of tooling problems.

As an additional help, tool steel charts make up the second part of this feature. Included in the charts are: (1) comparable tool steel brands; (2) composition of all the major AISE-SAE tool steels; (3) selection, forging and heat treatment of all these steels.

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TOOL STEEL CHARTS

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Part Study

Standardization

Tolerances

Extras

Cutting Tools

Coolants

Jigs and Fixtures

Maintenance

Automation

TOOLING

PART STUDY COMES FIRST

◆ Every tooling decision is made with a finished part in mind. This finished part may be an end product or one of a number of parts or components. In either case, the principles you apply to get the most for your tooling dollar are the same. They involve the selection of the best methods and equipment to make that part to a specified quality, in the required amount, on time, and at the lowest possible cost.

Since the product design determine the equipment and manufacturing methods that will be used to make it, this bit of advice cannot be given too freely or too often: Study each part over and over. You'll find a periodic review of part design and processing methods will pay handsome dividends. Here are some of the things that may turn up:

Is the right material specified? Sounds elementary but let's look at an example. In one plant blueprints called for SAE 5160 steel for springs. The spec called for a maximum hardness of 300 Bhn so the material could be blanked. A cost study showed that specifying this hardness would cost a premium of $330,000. The saving was revealed by a close examination of steel extra price books. By taking a calculated risk and specifying "steel suitable for cold shearing and punching" this saving was made.

This is an exceptionally large dollar saving. But it may not be an unusual *kind of opportunity* to save dollars. Are there any savings like this possible in your plant? Chances are there may be several.

Tolerances are another fertile ground for discussion in tooling plans. You can often make important savings through (1) easing of tolerances that are *unnecessarily* tight, and (2) specifying just which tolerances can be broad.

Engineering departments like to hold all tolerances within the closest limits they think necessary, favoring ideal rather than commercial tolerances. This is a justifiable position for engineers to take. But if tolerances are unnecessarily tight, they will add substantially to your production costs.

Don't deny your designers the right to specify close dimesions if they believe them to be absolutely necessary. But your methods and production people have an equal right to be heard. In fact it's their responsibility to point out not only the savings if tolerances are eased, but problems that might arise if they're not.

What Part Study May Turn Up

Need for minor design changes to simplify manufacturing.

Ability to use a less expensive material.

Unnecessarily tight tolerances.

Possibility of combining operations.

Need for better hole location.

Reduction in tool cost.

Where You Can Apply Standards

Industrial equipment

Tools

Processes

Materials

Methods and specifications

If you decide to check up on tolerances you might want to follow the example of this midwest machine tool builder.

When more and more obviously too-tight tolerances started to turn up on new part designs, the management created a special review board to go over every active part print in the file. Dozens of meaninglessly tight dimensions were corrected.

Even though this is not a mass-production plant, there was a noticeable gain in productivity, and rejects dropped off to a negligible amount. Best of all, quality of the finished product was not diminished in the least.

The business of hole location, both as to spacing and accuracy of position, can often be a critical factor in your drive to get the most for your tooling dollar. When holes are bunched together, separate machining operations may be necessary.

Granted that it's not always possible to open up hole spacings. But you should always keep in mind that the ability to combine operations may bring substantial savings.

The chief tooling executive of a large auto plant preaches, "Watch your hole spacings," to his designers and engineers. He's learned by experience that the purchase of entire machines can sometimes be saved, simply by carrying standard hole spacings over from one model design to another. And he adds, "Never assume that this has been done just because it ought to have been done."

Generally speaking, many are inclined to expect too much from foundries and die shops. If possible, a foundry should always be given at least a 1/16 in. more. Similarly, you should try to make at least 0.030-in. tolerance available to forge shops. Much time and valuable savings can often be realized if the engineering will permit the widest tolerances possible without endangering performance.

The general understanding in the large volume, metalworking industry is that, unless otherwise specified, 0.010 in. tolerance applies. Engineering can often simplify manufacturing problems by stating specifically that tolerances say, up to 1/64 or even 1/16 will be permissible for a particular dimension. "If it doesn't matter, tell us how much it doesn't matter," is a helpful policy in arriving at processing decisions.

In the smaller plants, there's a tendency to limit the number of people participating in these tooling decisions. But remember the larger organizations—firms that have demonstrated their ability to produce efficiently—generally encourage full discussion of tooling plans before final decisions are made.

For top efficiency, part study at the outset of a tooling program is a job that calls for teamwork. Your team should include the best brains in product design, methods, tool engineering, metallurgy and manufacturing.

Final decisions can often be reached faster by making duplicate sets of parts for each new product. One set of parts should be assembled; the second set is then made available for examination and study. After examining parts and prints, a tentative processing schedule can be set up by process engineers.

Planning Pays Off

Thorough planning is undoubtedly your best route to low cost tooling. Tooling up for a new product with as few pressures as possible is bound to result in more efficient processing.

Here is a checklist of steps you can take in planning new tools and facilities: It follows the order in which tooling decisions are made.

▪ 1. Determine method of manufacture and exact sequence of operations. 2. Prepare detailed list of tools required. 3. Select machinery and equipment to complete processing. 4. Develop and coordinate necessary work standards. 5. Develop and coordinate direct and indirect labor requirements. Associated activities include materials handling, automation, packaging, and selection of process equipment and plant facilities.

Ford Motor Co.

PART STUDY at the start of a tooling program calls for teamwork.

Another device used by many firms with good success is the use of scale models (where the part is large or bulky). Scale models can usually be made more quickly and cheaply than actual parts. New techniques for making plastic scale or full size models should be studied as a means of promoting realistic tooling decisions at the earliest possible moment. Use of models also helps to eliminate many misunderstandings that may arise if drawings are used.

One method sometimes used to check tooling plans is to make a layout that is 10 times actual size in order to check possible buildup of tolerances under production conditions. The method is not new but its use has been largely restricted to aircraft parts and a few very large plants in the metalworking industry.

Standardization, or at least the desire to achieve a maximum of it should permeate every phase of your tooling plans. The extent to which standardization can be applied depends on the volume, number of plants and many other factors. Generally speaking, its use is directly proportional to volume.

Simplify tool design

You should check every phase of your operations to see that standards are being used to the greatest extent possible. Here are the five principle classifications in which standards have been developed by the large manufacturing firms. (1) Industrial Equipment, (2) Tools, (3) Processes, (4) Materials, (5) Methods and Specifications.

Standards simplify tool design and purchasing; they also afford an opportunity to cut tooling costs through the reduction of inventory. You will find it helpful to keep these standards in mind when planning your tooling for a new product.

Obviously, you should apply standard tools wherever possible at the earliest opportunity in tooling up for a new job. Moreover each individual responsible for tooling decisions should be instructed about the benefits of, and opportunities for, standardization. Where standardization is not used, it is not uncommon to see procurement of a wide variety of special machines and tools that might not be necessary under a well-integrated standardization program. Most firms using standardization have been able to reduce greatly their purchases of special tools.

Bringing Out a New Product

Assuming design has been agreed upon and annual, peak volume and monthly requirements are set, here is the information you must develop before a new product is introduced:

1. **Parts list and specifications.**
2. **List of items manufactured or purchased from outside vendors.**
3. **Material specifications.**
4. **Process sheets.**
5. **Machinery and equipment requirements.**
6. **Machine tool load studies.**
7. **Materials handling layouts and plans.**
8. **Quality control gages and equipment.**
9. **Production tools (jigs and fixtures).**
10. **Durable tools.**
11. **Perishable tools.**

If You're an Automotive Supplier—

▪ Although copies of standards are generally available to suppliers of major automobile firms, many vendors who might use them profitably, even in a limited way, have not yet taken advantage of the offer by the major car producers to make their standards available.

▪ Included in the standards books developed up to the present time by auto producers on the subject of tools, for example, are standards for abrasives, fixtures, gages, holders and drivers, turning tools, cut-off blades, drills, milling cutters, reamers, taps, hacksaw blades, hammers and wrench sockets.

CHOOSING THE RIGHT EQUIPMENT

◆ SELECTION of machine tools can never be divorced from volume. Therefore, some of the first questions that must be answered in planning your tooling are: Do we *really* need semi-automatic or fully automatic equipment? Will hopper feeds and special conveyors speed up output and how much? Can't we get along with standard machines?

Another consideration: Will the use of high-volume production equipment result in unbalanced production?

While your tooling decisions are made on the basis of individual needs, the entire manufacturing process must be carefully integrated to achieve highest efficiency.

In most cases, where special features are desired you'll find it preferable to work with the machine tool builder rather than attempt to make tooling changes after the new machines are delivered. This includes automatic loading or unloading features, if any are to be used. Unless your requirements are unusual, such a procedure is usually desirable, both from the standpoint of the user of the machine and the vendor.

Most plants will find it advantageous for the processing group to make the final decisions and carry on negotiations with machine tool vendors. While the Purchasing Dept. places the orders and should require Processing to justify its expenditures, most arrangements are best carried out by Processing.

Development of sound vendor relations is a "must" for successful manufacturing. During recent years the feeling has developed in most plants that the customer needs the vendor just as much as the vendor needs the customer. Mutual respect and confidence in each other has had a great deal to do with the progress that has been made recently in the development of new and more efficient tooling.

Many considerations should be weighed in arriving at tooling decisions; suitability of the equipment for the job, price, delivery date, maintenance, adaptability for future products, amortization etc. are just a few.

Experience by many plants has shown the desirability of establishing a close relationship with a number of builders of basic equipment.

Tips on Buying Medium-Run Tools

▪ **Specify standardized spindle mountings wherever possible.** They permit the use of interchangeable arbors, chucks and tool holders on a variety of similar machines giving equipment more flexibility.

▪ **Consider the benefits of power-operated lifting and positioning devices.** These should be able to handle a variety of shapes and sizes but still be rigid enough to take full advantage of the machine's capabilities. Such devices do much to lessen operator fatigue.

▪ **Seek equipment that is designed to include both a loading area and a machining area.** This simple feature can increase machine output significantly. One example of this is twin-table milling machine that allows the operator to set up a workpiece on one table while cutting takes place at the other. Floor to floor time is considerably reduced.

▪ **Don't forget chip disposal.** A minimum of difficulty in disposing of chips can add significantly to a machine tool's productive capacity. It's preferable to have chips fall free of the machine elements into a chip box or suitable conveyor.

Some Benefits from Standardization

▪ With today's high production rates and huge tool investments, interruptions to production can be very costly. If your downtime is excessive you may reap benefits by specifying Joint Industry Committee standards for your new high production machines. Here are some of the things JIC standards have accomplished as far as equipment design is concerned:

1. Eliminated excessive use of flexible conduit on machines. 2. Promoted accessibility of things like motor hold-down bolts, lubrication ports. 3. Removed electrical devices from inside the body of the machine. 4. Provided added safety features. 5. Added sight gages for lubricant, and specified liquid-tight, flexible conduit and oil-tight push buttons. 6. Standardized control boxes.

However, spreading orders over the entire list of vendors may be less desirable, for example, than establishment of your firm as a substantial buyer from a few well-known suppliers.

As machines become more complicated, the question of extras is sure to come up. While it is neither possible nor desirable to spell out every single detail when ordering a semi-special or a special machine, the more details you can include in the purchasing agreement, the better it is for both parties.

Many firms have found it advantageous to assign qualified personnel (the tool trouble man, for example) to work closely with representatives of machine tool suppliers during the installation and tryout of new equipment. This practice usually results in getting the machine operating in the shortest possible period of time; it also avoids misunderstandings that might otherwise occur. It is always desirable to have an understanding as to the extent the vendors help will be available, if needed, in installing new equipment.

Anything management and engineering can do to acquaint manufacturing with the estimated requirements of the next few years is helpful in making buying decisions. To the extent that such information is available, manufacturing should be informed of future plans of the company. This applies particularly to information involving (1) anticipated future volume (2) the introduction of new products (3) major changes to existing products.

Cincinnati Milling Machine Co.

A GOOD REASON for buying standard equipment wherever possible is that resale value is higher.

The full capabilities of standard equipment should be closely examined before making any tooling decisions. Special machines have a definite place but many factors, including increased production, ability to eliminate manual handling, and man-hr must be carefully weighed against increased cost of the special or semi-special machine.

Amortization v First Cost

▪ Some of the more recent machines can actually produce parts faster than these parts can be loaded and unloaded. Where this situation exists it will often pay to investigate automatic loading and unloading features.

▪ In weighing this question it is necessary to keep in mind that substantial increases in American markets are predicted for the next 10 years. In most cases, special machines are selected for parts that will be amortized over a minimum of 5 years. Some plants are figuring even longer periods of amortization.

▪ The thing to look at is: cost per part over *the entire period of amortization*—not just first cost of the equipment. Another factor: during the next 20 years we may have trouble finding enough skilled workers to fill the needs of our expanding economy and prices are constantly going higher. As the skilled labor force decreases in proportion to the economy's need for them, greater will be the desirability of using special machines to meet production needs.

Adapt standard machines

A good bet often overlooked is the opportunity to adapt standard machines to special work. A good example is radial drills. Imagination and ingenuity will often permit use of adjustable, cluster heads on some machines for a remarkable variety of operations. This was adequately proved, particularly during the Korean War when many firms found heretofore unsuspected versatility in their special and semi-special machine tools.

It pays to buy rugged equipment having more power than may be needed at the moment. The reason is simple: feeds and speeds, generally speaking, are increasing. Another reason: cutting tool investigations have often disclosed that unexpected results may come from the use of feeds and speeds that previously seemed entirely impractical. Sometimes it even pays to try super speeds and very light cuts without lubrication

Rockwell Mfg. Co.

A GOOD BET often overlooked is the ability to adapt standard machines to special work.

where wet cutting has previously been specified.

There are sometimes surprisingly simple ways you can increase the range of usefulness of standard machines. For example, by locking the spindle and mounting a saw driven by an air motor on a machine base, a slotting operation can be carried out on a standard machine. The number of opportunities to eliminate a single handling of the part by mounting additional equipment on standard bases is practically unlimited. In each case, cost of the equipment, speed and accuracy of the operation and other factors must be carefully weighed.

A compelling reason for selecting standard equipment wherever possible is the fact that resale value is higher. While there are limits about what can be done in allowing for resale in the original choice of equipment, some things are being done that have resulted in substantial economies over a period of years.

Upgrade Equipment

For example, circularizing descriptive information throughout the plants in your area about equipment about to be sold as scrap often results in cutting down the average age of machines in operation. The practice is an old one —but it is often surprisingly effective. A program of constantly upgrading your equipment may save money for you.

Another method that is being used successfully is to prepare an evaluation sheet showing all equipment attached to special machines before they are turned over for sale by Purchasing. This list includes pumps, electrical controls, valves, air cylinders etc. If the bids received by Purchasing do not exceed the value of these items plus salvage, the machines are stripped and the machine bases are sold as junk.

Any firm that will take all possible steps to encourage teamwork between engineering and manufacturing will harvest dividends in the form of lowest possible investment in tooling and minimum production costs. Where the operation is large enough, it may pay to appoint a liaison engineer to help bring harmonious cooperation between these two groups.

Use your specialists

Make the best possible use of your specialists. Foundry experts should go over new castings and make suggestions that may simplify patterns and cores or help improve foundry practice. If you have no one available on your staff, it may even pay to bring in a consultant from the outside.

Similarly, machine shop experts should check all drawings or models to see that they can be produced economically and that they can be produced on existing equipment. It is often surprising how little thought is given to "making the part suitable to the equipment."

Considerable thought should be given to this subject: where metalworking plants used to have two, three or even more separate, individually-operated machine tools, there is now available a single multi-purpose machine tool. The multi-purpose tools eliminate handling, improve accuracy, increase production. If the increased cost can be justified—and the higher investment is justifiable in many applications—the semi-special or special multi-purpose machine should be chosen.

Combine operations

By working closely with the machine tool vendor, it is often possible to combine in one machine a whole series of operations that would have undoubtedly required separate machines and multiple handling only a few years ago.

With rigidity requirements increasing steadily, production shops are constantly looking for more "beef" in their equipment. This trend is being met by the machine tool builders in new equipment designs.

Another trend worth watching is this: some of the more recent machines can actually produce parts faster than these parts can be loaded and unloaded. Where this situation exists it will often pay to investigate automatic loading and unloading features, many of which may have to be engineered for the particular operation.

It will also pay you to think about the advantages of horizontal spindles. Improved accessibility is one advantage; greater rigidity of the spindles is another. Also, in your high cost, high production machines have you considered the installation of qualifying gages? Many costly machine wrecks have been avoided by the installation of low-cost, qualifying gages.

LOWERING ACTUAL CUTTING COSTS

◆ One important opportunity to cut tooling costs is sometimes overlooked by smaller firms. This is the use of carbide cutting tools for a very broad range of machining applications. There's nothing wrong with taking a cue from some of the larger auto firms, who use carbides exclusively for machining cast iron. Intermittent cuts are no longer a barrier to the use of these tools if they are properly supported and the machine has ample rigidity.

You might be able to benefit from the use of round, triangular and square carbide tool bits that can be quickly inserted in positive-clamping holders. Such bits require no brazing.

Two types of these carbide-insert bits are available (1) long, re-usable shapes, and (2) wafer-like throw-away types. The re-usable tools are rotated until the cutting edges at one end are dull. Then they are turned end-for-end and rotated again until there are no fresh cutting edges available. When all cutting surfaces are dulled, the tools are resharpened.

The throw-away tools are also rotated until edges are dull. But these small pieces are discarded instead of being resharpened. Despite the apparent waste, the throw-away bits are far less expensive to use, in many instances.

In many of the big-volume plants it is difficult to find a carbon steel cutting tool outside the tool room. Production drills, milling cutters and turning tools are usually of the high speed steel or carbide variety; the cost factors simply work out in their favor.

Do you conduct regular studies on your various machining operations to find ways to reduce the cost of drills and tool bits? Keep making production performance checks. They may lead to a new tool design or a change in specifications that will give you still more for your tooling dollar.

A particularly successful tool engineer in one of the auto plants puts it this way: "We try anything that we think might work—and even a good many setups that we're fairly sure *won't* work. It's surprising how many things that aren't supposed to work turn out to be practical solutions for our machining problems."

Are you placing plant-wide responsibility for tool costs in your tool trouble man or a top tool engineer? Concentration of responsibility generally produces better results than departmental responsibility.

Improving tool life

A word of caution: Every experienced tool engineer has well-defined ideas about the life of cutting tools. Occasionally, a particular cutting operation may give disappointing results. Although some effort should be made to correct the situation, it is possible to spend more time on the job than can be justified by the possible saving resulting from improved tool life.

One of your best opportunities for saving money on carbon and high speed steel cutting tools is through the use of standards. Many of the big auto manufacturers have developed such standards as a result of extensive research and consultation with their vendors. Copies of these specifications for turning tool bits, milling cutters, drills, reamers and other tool shapes can be obtained from most companies on request.

To the extent that such standards are workable in smaller plants, their application may bring the following benefits: (1) inventories of

Three Points of Tool Cost Control

1. PURCHASING

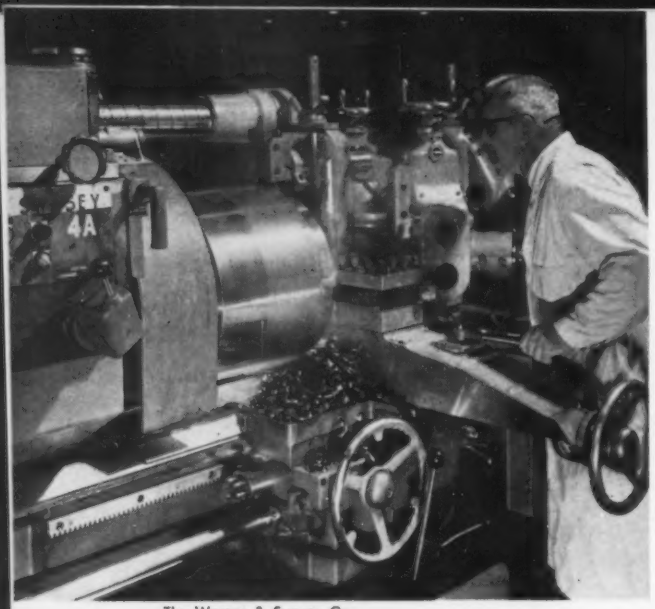
Buy in advance, buy enough, and buy standard tools whenever possible. Work out a good classification system and keep an inventory card on each tool. Re-order as soon as the minimum inventory mark is reached. Revise the minimum inventory point to reflect increased or decreased tool usage, longer or shorter delivery times.

2. SHOP USE

Keep an orderly tool crib, and maintain a foolproof check-out system for all workers authorized to requisition tools. Keep a close eye on employee and tool performance; trace back immediately if breakage or any other performance condition points to abnormal expense. It's surprising how quickly bad habits and costs can zoom if they're not reviewed thoroughly and systematically.

3. MAINTENANCE

Dull tools produce scrap parts. Specify the maximum usage each tool should have, and use a workable system to see that it does not operate beyond that point. Regrinding should be done only by designated, responsible personnel. Give them the proper equipment to do a good job. Again, keep checking to see that it's done.



The Warner & Swasey Co.

ONE OF YOUR BEST opportunities for saving money on carbon and high speed steel cutting tools is through the use of standards.

tools can be reduced, (2) expensive special tools can often be dispensed with, (3) tools can be bought in larger quantities for worthwhile discounts, (4) charges of favoritism in purchasing can be minimized.

Complete standards for carbide tools have not been developed by the auto industry, although standards for carbide tool designs have been adopted by some of the major car makers.

Check new tools

It helps your purchasing department, too, if tool requirements are specified for at least 90 days. Where tools are bought for the first time, at least three sets are usually purchased. Suitable records must then be set up to show original specifications, quantity requirements, design revisions, usage, obsolescence and salvage.

It follows that your inspection group should check all new tools for material grade, dimensional accuracy, form, hardness, and, if applicable, surface finish.

Preventive measures usually pay off in the necessary routine of changing dull, worn cutting tools. Wherever it is practical to do so, insist that proper tool-change cycles be established. They may be based on tool wear, quantity, regrinding cost, accuracy requirements, machine downtime for changes, and other factors. The point is: Establish these facts, formulate your program, then work the program.

Careful checking of worn tools may suggest ways to improve tool life. How much breakage occurred? How much chipping? These are some of the tell-tale signs of abuse. It also pays to keep a close eye on grinding practices to see that the right wheels are used to keep cutting tools in good condition.

Pre-setting of cutting tools for standard machines, and for rotary or dial-type multi-purpose equipment, often saves valuable production time and money. Although opportunities for this practice may be limited, pre-setting is both sound and economical.

Laydown broad rules

Final cutting tool details you'd be wise to establish include regular checks on handling, storage and salvage. These areas may present savings opportunities that have never been realized, simply because no one has ever taken the time to draw up a workable program. Careless tool handling, a tendency to "throw tools around," can cost you plenty.

The question of lubricating or cooling a machining operation must be answered in terms of the specific conditions involved. In general, laying down a set of broad rules to cover a wide range of cutting conditions isn't too satisfactory. New coolant formulas, and techniques for applying them, come along almost every day.

With the proper application of the right cutting fluid, friction between the cutting tool and the chip is reduced. This means that tools will last longer and work quality will improve. In addition, power requirements will be less, rusting will be prevented, and workpiece dimensions will be maintained more accurately.

Generally speaking, you have your choice of two classes of cutting fluids. One type includes the so-called straight cutting oils which are supplied either in ready-to-use form, or in the form of a concentrated base which the user dilutes with a blending oil. The second class offers the water-soluble or emulsion-type bases to which water is added. Proportion of the water addition is determined by the nature or the severity of the machining job you have to do.

On the other hand, a considerable amount of work is being done on the dry machining of steel. The theory being investigated is that carbide

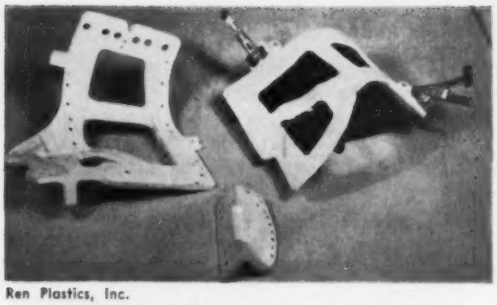
Make Your Jigs and Fixtures—

1. EASY TO WORK WITH

Don't force your operators to use something that's difficult to load or unload. Utilize hydraulic or pneumatic clamping if you can. Where manual clamps must be used, make them easy to get at.

2. IN DUPLICATE—IF IT WILL SAVE TIME

Where setting up a part in a fixture takes too many minutes away from actual machining time, it may pay you to have a helper prepare the workpiece in advance. One or two duplicate fixtures can keep a step ahead.



Ren Plastics, Inc.

PLASTIC JIGS and fixtures are light in weight, can be easily repaired and replaced.

tools will stand high temperatures, but tend to fail as a result of rapid changes in temperature. Accordingly, researchers are checking the possibility of dry turning at speeds of several thousand feet per minute.

But dry turning presents some problems. Hot, flying chips could be a hazard to personnel. Also, extensive changes in machine tool design may be required to gain the extra tool life that investigators hope to achieve.

Wherever you can standardize on coolants, even to the extent of a central supply system for banks of machines, you will undoubtedly realize important savings. But you'll always find some important production jobs where an all-in-one cutting fluid is not the answer.

Cutting tool lubrication is likely to be a controversial subject between your tool engineering and purchasing departments. Purchasing will favor more standardization while the tool engineers will insist that too much uniformity hampers their right to specify the one best material for the job at hand.

The use of coolant in a fine spray mist is working out very well in a growing number of progressive plants. The technique has brought some noteworthy savings in production and maintenance costs. In the automobile industry, for example, it is used for a number of drilling, milling and grinding operations. One large Detroit plant uses a mist of coolant in grinding carbide tools.

Filter use grows

To attempt a plant-wide installation of mist coolant equipment would probably involve a heavy financial outlay. To be sure you get the most for your dollars in the coolant area, try these new ideas on a small scale to see if the supposed benefits are enough to outweigh the cost.

Another factor contributing to decreased machining costs is the growing use of coolant filters. The initial installation cost of the several types that are available appears to be offset by (1) ability to keep grinding wheels from loading up, (2) better tool life, (3) better bearing life, (4) improved part-surface finish, (6) lower wheel-dressing costs. The latter advantage can be especially important in times when the supply of industrial diamonds may be critically short.

Low-cost fixtures

Many metalworking firms do not pay enough attention to low cost jig and fixture methods. This applies particularly to the smaller establishments which stand to benefit most from new short run tooling techniques.

For example, plastic drilling and milling fixtures can be made very quickly and at surprisingly low cost. As for stability and accuracy, their ability to hold critical dimensions within 0.0001 in. is not unusual. Plastic jigs and fixtures are light in weight, and they are easily repaired or replaced. With all of these advantages, their use has increased substantially in recent years.

You might also consider the use of weldments, which are becoming increasingly favored for heavier fixtures. They can be made quickly, and fast delivery might be a big help to you in getting your tooling program to the point of production. Weight reductions in welded fixtures can often add up to important savings. But weight saved need not mean a loss of rigidity or accuracy. You'll find that fabricators can usually supply highly rigid fixtures at reasonable cost.

However, where a large number of fixtures is required, don't overlook the fact that castings may cost you less than the welded variety.

Are Your Machining Speeds Over 1000 SFPM?

▪ If they are, are you following the trend toward the use of heavy-duty, water soluble base emulsions? Here are some of the advantages reported:

1. Effective flow of coolant to the chip-tool interface is assured by the high wettingout properties of these fluids.

2. A basically high sulphur content plus additions of polar-type fat produce a solid anti-weld lubricant between tool and chip.

3. Even at low cutting speeds, the coefficient of friction is only slightly inferior to that of highly fortified cutting oils. At speeds above 60 sfpm, the coefficient of friction gives results equal to those obtained with straight oils.

4. Antiseptic properties of the water-soluble fluid emulsions discourage bacteria growth and inhibit rancidity.

5. Rust protection is excellent.

GAGING THE WORK

◆ YOUR SNAP, ring, and plug gages, and your micrometers, Johansson blocks and other precision measuring and quality control devices, represent a fairly large portion of your tooling dollar.

You'll get a better run for your money on such items by taking extra precautions to keep them in good shape. For one thing, they'll last longer. For another, accurate instruments keep your product quality high, your scrap rate low.

A simple practice adopted several years ago by a U. S. government plant might bring you considerable savings in gage expense. It requires putting a 0.0002-in. thick black oxide coating on all standard snap and plug gages. (There are commercial firms who can do this for you.) When the coating wears off, the gage has worn down to the lower limit.

Trend to precision gages

There is a trend toward the use of air, electric and electronic gages in precision machining operations. Impetus comes from the demand for uniform dimensions in interchangeable parts, to a degree that cannot always be obtained when there is a chance for human error in manual gaging.

Take the air gaging trend, for example. Although the first cost of the equipment may be comparatively high, its advantages include (1) repetitive accuracy; (2) freedom from gage wear; (3) ability to measure a number of critical dimensions simultaneously; (4) on-the-spot checking, to minimize the production of scrap.

Automatic or transfer-line machine tools need built-in sizing controls to match their high speed operations. There are two general forms for these automatic gaging devices: One works *during* the machining cycle; the other *follows* it.

Signal stops machine

Ideally, the control system that functions during the machining process should provide (1) a signal to stop a machine altogether or perhaps change its action from a roughing to a finishing cut when a predetermined dimension is reached; (2) a signal to retract the cutting tool when the part is to finished size; (3) a signal to stop the machine when cutting tools become worn.

When sizing control follows a metal removal operation, your ideal setup would supply (1) a signal for tool adjustment when parts come outside mean blueprint specifications but within overall tolerance; (2) a signal to remove out of tolerance parts caused by tool failure; (3) a signal to stop the machine if a specific number of consecutive parts are outside established limits; (4) an impulse to stop the machine when tools are dull.

However, you can't always use all the ideal and desirable features of built-in sizing controls. Fixed-size tools such as drills and reamers make a sizing adjustment signal impractical. Instead, a signal should be used that warns of the need to change tools.

Also, odd-shaped parts often must be machined on fixtures that make it difficult to eject faulty pieces automatically. Best compromise is to have the off-size part initiate a machine-stop signal so that the workpiece can be removed manually. And where the controlled dimension will not affect subsequent operations, faulty parts can simply be marked for removal at the end of the cycle.

Depends on volume

But before you get into the more expensive non-manual types of gaging equipment, ask yourself these questions: (1) What is the volume of production involved on the job you're tooling up for? (2) What accuracy is required for the parts you're going to make? (3) To what extent can you eliminate part handling? (4) Will your machine operators have enough free time to do a thorough job of plain, manual gaging?

If the answers to these questions are self-evident in favor of more gaging speed and accuracy, you had better talk to some of the manufacturers of precision measuring devices.

In plunge grinding, for example, a new electronic gage will control everything from the first roughing operation to final sparkout. It can be fitted on your existing equipment in a few hours, works in spite of oil and grit, and requires virtually no attention.

CAREFUL on-the-spot checking is essential where operations involve high speed machining.

The National Acme Co.

Gages, Gages—Everywhere?

Certainly not scattered all over your plant—unless you want your gage costs and scrap rates to skyrocket. According to their intended use, keep them confined to these areas:

1. The machine tool itself, and only when the operator is qualified to use certain gages.

2. A mobile inspection cart. Manned by an experienced inspector, a cart containing a variety of gages and instruments can rove from one machining section to another to examine work at critical stages.

3. A master gage and spare gage storage room. For best results, keep the atmosphere controlled for even temperature and low humidity. Put an experienced, reliable man in complete charge of this department. Give him full responsibility for accuracy, inventory, maintenance.

Jones & Lamson Machine Co.

The Sheffield Corp.

Abvoe—Right: FOR ultra-precision work, an oscillograph checks the accuracy of this facing operation.

Bottom—Right: AMONG other advantages, air gages have the ability to measure several dimensions at one time.

Getting the Best from Your Gages

■ Every time a plain plug, ring, limit or snap gage is used it can be expected to wear a little. Here are some tips that should be followed to minimize gage wear and stave off the expense of repair or replacement.

1. Don't use force in any gaging operation. Jamming a snap gage over a workpiece, for example, can ruin both the gage and the part.

2. When a ring or a plug gage is used to check internal or external diameters, it is best to keep it moving slightly to avoid seizure.

3. Keep gages out of harm's way when they're not in use. Keep them covered, and dehumidify the atmosphere in your gage storage room. Apply a light coating of rustproofing oil to gages that are used frequently. Gages that are rarely used can be protected by dipping them into a peelable plastic material.

4. Never let anyone use a master, an inspection or a working gage for anything but its designated purpose.

5. Downgrade worn gages to larger sizes and bring in new gages in the smaller sizes to keep the measuring range intact.

PLANNING YOUR MAINTENANCE PROGRAM

◆ GETTING THE most out of your tooling dollar may depend largely on keeping your plant running with minimum lost time for shutdowns, The answer here is a sound maintenance program, carried out to the letter.

Fixing responsibility so that it cannot be avoided can be one of the most important requirements of a good maintenance program. A number of plants assign tool trouble men to particular shop areas, and hold each man responsible for keeping his department in good running order.

Perhaps you don't find it necessary to undertake major, periodic overhauls on your metalworking equipment; many firms do not. However, you will find that it pays to know the approximate life expectancy of individual machine parts, as estimated from past experience. The ability to predict bearing or electrical component failures and prevent them before they occur is one way to avoid big losses in production. Keep ample supplies of replacement parts on hand in case of equipment failures.

Change tools early

Where cutting tools are anywhere near their life expectancy, it may pay you to change them if the machine tool is shut down for any other reason. There isn't much point in shutting down a few minutes later for a tool change, even if the change wasn't fully indicated when something else needed attention. Might as well kill two birds with one stone whenever it can save you time and money in your maintenance program.

Good housekeeping is a phase of maintenance that invariably pays dividends, although many plants make no organized effort to promote the policy that neatness and efficiency go hand in hand.

Many firms find that it pays dividends to foster a periodic checkup and grading system as an incentive to keep department areas tidy. The members of the plant housekeeping committee make a monthly inspection tour of the entire factory. Grades, up to 100 pct for a perfect score, are given to each department and posted on large signs for everyone to see. The committees recognize, of course, that some shop areas are more difficult to keep clean than others and lend themselves to better housekeeping.

Buy good materials

Since your tooling dollar brings you the largest return when it works efficiently, there should be every reason for you to buy good maintenance materials. Another important thing is to standardize on as many of these items as you possibly can.

Invite various vendors of maintenance materials to qualify their products under your standards. Better yet, ask them to give you a hand in setting up top-notch requisites.

The development of standards encourages purchase by specification and performance rather than by trade name. Companies who use such a system claim that it saves them many thousands of dollars annually. If you're not certain how to go about this procedure, write to some of the giant corporations. Most of them will be happy to tell you exactly how they establish maintenance standards, both as to methods and materials.

Standard Maintenance Items

▪ Management in smaller metalworking plants is often surprised to discover how far the large companies go in buying maintenance items to standard specifications. Here is a list supplied by a major automobile producer:

1. **Materials handling conveyor equipment**
2. **Ladders**
3. **Paint**
4. **Valves**
5. **Steel castings**
6. **Welding supplies**
7. **Cleaning supplies**
8. **Foundry supplies**
9. **Chemicals**
10. **General shop supplies**
11. **Aprons and gloves**
12. **Drafting supplies**

Where Planning Pays

▪ When you've designed a part, planned a tooling program and started production, that's half the battle. The other half is won by keeping everything running smoothly. Careful maintenance is essential on all of these elements in your production setup:

1. **Machine tools**
2. **Cutting tools**
3. **Gages and instruments**
4. **Conveyors, trucks and hoists**
5. **Hydraulic, pneumatic and water piping systems**
6. **Electrical equipment and power lines**
7. **Jigs and fixtures**

IS AUTOMATION THE ANSWER?

◆ AUTOMATION must always be fully justified from an economic point of view. Remember also that automation has come about as the need developed for a bigger volume of goods at lower cost. In every case, automation is installed (1) to increase volume, (2) to reduce costs, (3) to improve quality, (4) reduce fatigue.

But many parts simply cannot be handled automatically. Before you consider automation seriously, first determine if the part actually can be handled by automatic equipment.

In a broad sense you can think of automation as any device that eliminates fatigue, improves accuracy or improves quality without requiring human supervision or measurement. You may not think of it as automation, but an air cylinder used to push a radio set into a cardboard shipping box is, in the broadest sense, automation.

Similarly, a device that automatically assists in loading crankshafts on a lathe after merely pressing a button, exemplifies automation. Finally, an automatic gage that stops a machine when a part is produced outside acceptable limits exemplifies automation.

Some tool engineers seem to favor a program calling for 100 pct automation or no automation. They tend to avoid mixing up automatic and manual production in the same line. On the other hand, a number of tool engineers report they are able to justify automation of certain segments of a production line where the entire line would not justify the expense of full automation.

In one case, it is reported that the automatized section of a line paid off in a little over 10 months whereas the entire line would not have been amortized for 12 years or longer.

The beneficial results of automation may be summarized as follows: faster production, closer tolerances, more rigid (often automatic) inspection, lower unit cost, reduced unit overhead and better working conditions. Jobs are made safer, easier, cleaner and, generally, more interesting.

Just coming into the picture in a major way is automatic assembly of manufactured parts. The opportunity to use automatic assembly is open to the overwhelming majority of metalworking plants. Initial cost varies over a wide range but many, comparatively low-cost installations, are working well and amortizing themselves in comparatively short periods of time, sometimes within months.

Practically any metalworking plant has an opportunity to reduce costs by investigating thoroughly the possibilities of hopper feeds and other simple devices that are becoming widely used for automatic or semi-automatic assembly.

Choose the right man

In the opinion of many well-informed observers, automatic assembly is the best opportunity that exists today for reducing production costs. More important perhaps is the fact that this opportunity is available to small plants as well as large plants.

Choosing the right man for the job may make or break your automation program. It is well known that certain engineers have a flair for mechanical design. The designer of automation equipment must have imagination, engineering knowledge, design experience and at least a little "Rube Goldberg" instinct. With this type of individual in charge, automation programs will move along at a much more satisfactory pace than they might otherwise.

Teamwork is highly essential. A good design engineer working on such a program makes sure his designs are compatible with the needs of other designers working on the automation program.

Automation designs generally begin to take form very early in the layout development. The designer must, therefore, be ready to make quick calculations and simple sketches to be used in justifying the economics of an automatic installa-

Automation Has Its Faults, Too

■ No discussion of the subject can be complete unless the possible disadvantages of an automated setup are considered. Here are the most common complaints:

1. *Maintenance costs are too high.* It is possible that an improperly planned setup could be so expensive to maintain in good working order that the hoped-for savings never would materialize. A combination of design ingenuity and practical preventive maintenance is a must in all cases.

2. *Initial cost of an automated setup is too high.* There is no doubt that mass production requirements are almost always essential to justify the cost of designing, and building automation equipment, to say nothing of the time needed to install it and get it operating properly.

3. *The equipment is too highly specialized*—not nearly flexible enough for quick, economical adaptation to changes in product design, or even new products. Builders are attempting to minimize this complaint by making "unitized" or "building blocks" automated lines. They're applying more standardization, seeking quick ways to add, remove or exchange machining units and work-handling components.

Ford Motor Co.

VALVES, springs and retainers for Ford V-8 cylinder heads are placed on fixtures on this rotary table, and are automatically installed in place when they reach the assembly unit.

tion. Often, the *right kind* of automatic equipment costs little more than standard devices.

After deciding on a layout, detailed studies are begun. An overall automation layout is made. In some cases models and perspective drawings are made. The preliminary layout is then analyzed for estimated installation cost. These cost figures will either justify or fail to justify the installation from an economic point of view.

Following approval of an automation program, processing engineers, tool and die designers, machinery and equipment builders are consulted. Standardizing of working heights, coordination of operations must be developed or established. Clearances must be checked. Procurement of equipment, tryout and actual use for production are the final steps.

Some of the larger plants have set up special automation departments. Work begins with an investigation of the possibility of utilizing standard machines. By rearranging existing machines and tying them together mechanically, improvements in production efficiency can often be made. The big advantage in automation, of course, often comes through elimination of an operation —such as moving or transferring the part.

As experience accumulates, attention is given to the possibilities of parts and equipment which have been designed with automation in mind. The possibilities are examined, part by part, with the most promising possibilities placed at the head of the list. Most plant managers agree: in this automation business, it is important to learn to walk before you attempt to run.

It is usually advisable to give an engineer, carefully selected for the job, complete responsibility for at least one part. As detail work develops, this man must be available for consultation. Obviously, production and management officials also participate in discussions.

Automation's Benefits

■ Firms who have invested "tooling dollars" in automated machining setups agree that these are the major benefits derived:

1. Increased output from each machining unit chiefly because automatic part loading and unloading keep units working much closer to their rated capacity.

2. Better product quality due to (1) built-in sizing controls, (2) less damage caused by parts hitting each other or dropping to the floor.

3. Lower cost per part produced since manual handling operations are eliminated.

4. A higher degree of safety for personnel is achieved by the elimination of hazardous part-handling chores.

5. Floor space economy due to the neat, efficient manner in which work-handling devices and machining units are tied together.

6. Lower inventory of "work in process" because of the inherent start-to-finish nature of an automated setup.

7. Better working conditions.

WANT EXTRA COPIES?

A limited number of copies of "How To Get More For Your Tooling Dollar" including the Tool Steel Charts will be available upon request to Readers' Service Dept., The Iron Age, Chestnut and 56th Streets, Philadelphia 39, Pa.

Brands

Chemistry

Forging

Heat Treatment

Toughness

Wear Resistance

Machinability

Comparable Tool Steel Brand Charts

◆ ON THE FOLLOWING four pages you will find enlarged and completely revised editions of the comparable brand tool steel charts which have long been published by THE IRON AGE Brand names are those furnished by all major American tool steel manufacturers. They show all the brands that can be classified by American Iron and Steel Institute standard tool steel designations, the principal tool steel types in current use.

These charts are followed by eleven pages of tables compiled by and published with the permission of the American Iron and Steel Institute. They list chemistry, physical properties, forging and heat treating data which will serve as a guide in selection and identification of the various brands listed in THE IRON AGE charts.

Users will recognize that tool steels can not be arbitrarily selected on the basis of charts or tables alone. Such data serve as a guide which may have to be modified by experience. Where problems arise the wisest course is to get the advice of a producer or an experienced distributor.

Despite the remarkable progress of the Tool Steel Committee of the American Iron and Steel Institute, working with user groups like the Society of Automotive Engineers, tool steels are not yet standardized to the extent that carbon steels are. There are many tool steels made by the major producers that do not fall into any of the so-far accepted categories. And so, despite their widespread use, they are not listed here. They can, however, be found in the separately-published Twenty Fifth Edition of THE IRON AGE "Directory of Tool Steels."

It is clear from the charts and tables that the standard system now classifies tool steels in six major groups. Each group identified by a letter symbol usually contains a number of individual types of steels. These carry number symbols.

The percentages of the elements shown for each type are for identification only and should not be considered as the means of the composition ranges of the elements. In other words, they should not be used as specifications because steels of the same type vary somewhat in analyses, depending on the producer. Some may even contain elements not listed for that type.

Because of their widespread use and the number of brand names involved, the principal water hardening steels have been broken down into grades on THE IRON AGE charts. The grades (1, 2 and 3) are measures of quality. Within these grades various carbons (from 0.60 to 1.40) are available in most brands.

WATER HARDENING

Maker	W1 (Gr. 1)	W1 (Gr. 2)	W1 (Gr. 3)	W1	W2 (Gr. 1)	W2 (Gr. 2)	W2 (Gr. 3)	W3	W5	W7	Maker
Allegheny Ludlum	Pompton Special	Pompton Extra	Pompton	Drill Rod Pompton D. R.	Python	Extra Carbon Vanadium	Carbon Vanadium	Double Vanadium	Crow	.....	Allegheny Ludlum
Atlas	Atlas X-10	Atlas Refined 10	Maple Leaf	Commando D. R.	Atlas Special Alloy	.....	.....	.....	.....	.....	Atlas
Bethlehem	XXX	XX	XCL	.....	.....	.....	Superior	.....	.....	.....	Bethlehem
Braeburn	Special	Extra	Standard	.....	Special V	.....	.....	.....	.....	.....	Braeburn
Carpenter	No. 11 Special	No. 11 Extra	No. 11 Comet	Green Label Drill Rod	No. 11 Special Vanadium	No. 11 Extra Vanadium	Nitro	.....	.....	.....	Carpenter
Columbia	Special	Extra	Standard	.....	Vanadium Special	Vanadium Extra	Vanadium Standard	.....	.....	.....	Columbia
Crucible	Sanderson or Crescent Special	Sanderson or LaBelle Extra	Black Diamond	Sanderson Spec. D. R.	.....	Alva Extra	Granada Vanadium	.....	.....	.....	Crucible
Disston	Best	Extra	Standard	.....	Best Va Tool	Extra Va Tool	Regular Va Tool	.....	.....	.....	Disston
Firth-Sterling	Special	Extra	Sterling	Globe	Special V	Extra V	Sterling V	.....	Sterling M	.....	Firth-Sterling
Jessop	Washington	Lion Extra	Lion	.....	Washington Special	Lion Extra with V	Lion Vanadium	.....	.....	.....	Jessop
Latrobe	Special Carbon	Extra Carbon	Standard Carbon	Quality Carbon Drill Rod	Special Carbon with V	Renown	Standard Carbon with V	.....	CFS	.....	Latrobe
Simonds	Red Label	Blue Label	Diamond S	.....	Red Label V	Blue Label V	Diamond SV	.....	.....	.....	Simonds
Universal-Cyclops	Special	Extra	Standard	Carbon Drill Rod	Special Draco	Extra Draco	Standard Draco	Draco DV	27S	Hercules	Universal-Cyclops
Vanadium-Alloys	Colonial No. 14	Extra L	Red Star Tool	Blue Anchor	Colonial No. 7	Elvandi	Red Star Vanadium	Colhad	.....	.....	Vanadium-Alloys
Vulcan	Vulcan Special	Vulcan Extra	Fort Pitt	.....	Vulcan Special Vanadium	Vulcan Extra Vanadium	.....	.....	.....	.....	Vulcan

SHOCK RESISTING

Maker	S1	S2	S3	S4	S5
Allegheny Ludlum	Seminole Hard	.....	.....	.....	609
Atlas	Falcon 6 Falcon 4	.....	.....	.....	Monark 2
Bethlehem	67 Chisel	Imperial	.....	71 Alloy	Omega
Braeburn	Vitro	Triton	.....	.....	.....
Carpenter	.....	Solar	.....	.....	No. 481
Columbia	Buster	.....	.....	.....	EC Smoothcut
Crucible	Atha Pneu	SMC 155	CC Chisel	LaBelle 2-70	LaBelle Silicon
Disston	Keystone Alloy Chisel	.....	.....	.....	D-29
Firth-Sterling	JS Punch	.....	.....	.....	Chimo
Jessop	Top Notch	RTS	.....	.....	No. 259
Latrobe	XL-Chisel	.....	.....	.....	.....
Simonds	Commando 47	Havoc	.....	.....	Orleans
Universal-Cyclops	Alco M Alco S	Venango	.....	67	67
Vanadium-Alloys	Par-Exc	.....	.....	Silman	Mosil
Vulcan	DA	.....	Blue Edge	4870	.....

COLD WORK

Oil Hardening

Maker	O1	O2	O7
Allegheny Ludlum	Saratoga	Deward	Utica
Atlas	Keewatin	.....	.....
Bethlehem	BTR	.....	67 Tap
Braeburn	Kiski	S.O.D.	.....
Carpenter	.....	Stentor	.....
Columbia	Exi-Die	.....	.....
Crucible	Ketos	Paragon	.....
Disston	Mansil	.....	.....
Firth-Sterling	Invaro 1	Invaro 2	Meteor
Jessop	Tru Form	Special Oil Hardening	.....
Latrobe	Badger	Mangano	.....
Simonds	Simonds Teenax	Simonds 864	.....
Universal-Cyclops	Wando	.....	Para
Vanadium-Alloys	Colonial No. 6 Non-Shrinkable	.....	Red Star Tungsten
Vulcan	Oil Hardening	Non-Shrinking	Hardrite

Medium Alloy, A.H.

Maker	A2	A4	A5
Allegheny Ludlum	Sagamore	.....	Airloy
Atlas	Cro-Mo-Loy	.....	.....
Bethlehem	A-H5	BA-H	.....
Braeburn	Airque	.....	.....
Carpenter	No. 484	Vega	.....
Columbia	E-Z-Die Smoothcut	.....	.....
Crucible	Airkool	.....	.....
Disston	Crairmo	.....	.....
Firth-Sterling	Airvan	Airmo	.....
Jessop	Windsar	.....	.....
Latrobe	Select B Fm	.....	.....
Simonds	Airtrue 51	.....	.....
Universal-Cyclops	Sparta	.....	.....
Vanadium-Alloys	Air Hard	.....	.....
Vulcan	Vuldie	Vairloy	.....

Grade 06, listed as an SAE standard, is a molybdenum graphitic tool steel manufactured by Timken as Graph-Mo, and by Allegheny Ludlum as Oilgraph.

(Cold work steels continued on next chart)

COLD WORK (continued)

High Carbon—High Chromium

Maker	D1	D2	D3	D4	D5	D6	D7
Allegheny Ludlum	.....	Ontario	Huron	Grade 124	FCC 66	.....	.....
Atlas	.....	F.N.S.	N.N.	.....	.....	.....	.....
Bethlehem	Lehigh L	Lehigh H	Lehigh S	.....	.....	.....	.....
Braeburn	.....	Superior 3	Superior 1	AT-2	.....	.....	.....
Carpenter	.....	No. 610	Hampden	.....	.....	.....	.....
Columbia	.....	Atmodie	.....	.....	.....	Superdie	.....
Crucible	Airdie 110	Airdie 150	.....	HYCC	Aero 12-3	.....	HYCV
Diesten	.....	Croloy	812 Die Steel	.....	.....	.....	.....
Firth-Sterling	.....	Cromovan	Triple Die	.....	.....	.....	.....
Jessop	.....	CNS-1	CNS-2	.....	.....	.....	.....
Latrobe	.....	Olympic Fm	GSN Fm	.....	Cobalt Chrome Fm	.....	BR-4 Fm
Simonds	.....	Simonds C.C.M.	Simonds 12225	.....	.....	.....	.....
Universal-Cyclops	.....	Ultradie 2	Ultradie 1	Ultradie 1M	EK-81	.....	.....
	.....	Ultradie 3	.....	.....	.....	.....	.....
Vanadium-Alloys	.....	Ohio Die	.....	Crocar	Ohio Die Cobalt	.....	.....
Vulcan	.....	Alidie	Hi-Pro	.....	.....	.....	.....

HOT WORK

Chromium Base Types

Maker	H11	H12	H13	H14	H15	H16	Maker
Allegheny Ludlum	Grade 170	Potomac	Potomac M	Grade 593	.....	.....	Allegheny Ludlum
Atlas	Crodi 58	Crodi	.....	Red Indian	.....	.....	Atlas
Bethlehem	Cr-Mo-V	Cr-Mo-W	Cr-Mo-V (High V)	.....	.....	.....	Bethlehem
Braeburn	Pressurdie 3L	Pressurdie 2	Pressurdie 3	Pressurdie 1	.....	.....	Braeburn
Carpenter	No. 883 Low	No. 345	No. 883	.....	.....	.....	Carpenter
Columbia	Firedie	Alcodie	Vanadium Firedie	.....	.....	.....	Columbia
Crucible	Halcomb 218	Chromow	Nu-Die V	CCS	Halmo	Cr-W	Crucible
Diesten	.....	Mix 873 Hot Die	877	.....	.....	.....	Diesten
Firth-Sterling	.....	HWD 1	.....	.....	.....	.....	Firth-Sterling
	HWD 2	HWD (Modified)	HWD 3	.....	.....	WCR	
Jessop	.....	.....	.....	.....	.....	.....	Jessop
Latrobe	Dica B—Modified	Dica B	Dica B—Vanadium	.....	.....	.....	Latrobe
Simonds	Dycast 1	LPD	VDC	Lumdie	.....	.....	Simonds
Universal-Cyclops	Thermold A	Thermold B	Thermold AV	K-S	.....	K-R	Universal-Cyclops
Vanadium-Alloys	Hotform 2	Hotform 1	Hotform V	.....	.....	.....	Vanadium-Alloys
		Hotform 3					
Vulcan	Magal	TCM	Vulcast	.....	.....	.....	Vulcan

HOT WORK TOOL STEELS

Tungsten Base Types

Molybdenum Base

Maker	H20	H21	H22	H23	H24	H25	H26	H41	H42	H43	Maker
Allegheny Ludlum	.....	Atlas A	.....	.....	Mohawk	.....	LXX (Low Carbon)	LMW (Low Carbon)	DBL (Low Carbon)	VLM (Low Carbon)	Allegheny Ludlum
Atlas	.....	Seneca, Hodi	.....	.....	Spartan 5	.....	.....	.....	.....	.....	Atlas
Bethlehem	.....	57 HW	.....	.....	57 Special	.....	Special HS-55	.....	.....	HW-8	Bethlehem
Braeburn	.....	T-Alloy A	T-Alloy	HCA	T-Alloy B	T-Alloy C	Vines HW	.....	Braemow Special	.....	Braeburn
Carpenter	.....	T-K	.....	.....	.....	.....	Star-Zenith Low C	.....	.....	.....	Carpenter
Columbia	.....	Formite No. 2	.....	.....	Formite No. 3	.....	.....	.....	.....	.....	Columbia
Crucible	.....	Peerless A	Peerless LCT2	Halcomb 236	Peerless LCT	Peerless LLCT	Rex AA	Low C. TMO	Low C. M$_2$	Low C. Rex VM	Crucible
Diesten	.....	572	.....	.....	.....	.....	.....	.....	.....	.....	Diesten
Firth-Sterling	.....	L.T.L., L.T. Forging Die	.....	B.D.C.	.....	XDL	XDM, XDH	.....	.....	.....	Firth-Sterling
Jessop	.....	2B-LC	2B-HC	.....	2B-MC	.....	.....	.....	.....	.....	Jessop
Latrobe	.....	CLW	.....	Kalkos	CHW	EHW No. 1	Electrite 5XL	Low Carbon T2Tmo	Electrite 7XL	Low Carbon TNW	Latrobe
Simonds	.....	D.N.V.	.....	.....	.....	.....	.....	.....	.....	.....	Simonds
Universal-Cyclops	.....	B-44-J	B-44	Thor	B-4-B	B-4-A	B-6-X	Motung (0.65C)	Motung 852 (0.60C)	Mo Van (0.55C)	Universal-Cyclops
Vanadium-Alloys	Hotpress	Marvel	.....	WW Hotwork	SC Special	Forge Die	"J" Temper Red Cut Superior	.....	0.65C Vasco MZ	0.60C Van-Lom	Vanadium-Alloys
Vulcan	.....	30 Calo Ferro	.....	.....	50 Calo Ferro	.....	Wolfram, Low C	.....	TM-6, Low C	.....	Vulcan

HIGH SPEED TOOL STEELS

Tungsten Base Types

Maker	T1	T2	T3	T4	T5	T6	T7	T8	T9	T15	Maker
Allegheny Ludlum	LXX	ML		Panther Special	Super Panther					Panther 5	Allegheny Ludlum
Atlas	Spartan 7	Trojan		Powhatan	Nipigon						Atlas
Bethlehem	Special HS			Comokut			Extra Special HS			Red Sabre	Bethlehem
Braeburn	Vineo	Twinvan		Braeburn Cobalt	Bonded Carbide Jr.	Bonded Carbide					Braeburn
Carpenter	Star-Zenith							Gold Star			Carpenter
Columbia	Clarite	Vanite		Acmite							Columbia
Crucible	Rex AA	Rex Supervan	Rex 930	Rex AAA	Rex Supercut	Rex 440	Rex Champion	Rex 95	Rex 4V		Crucible
Disston	Katkwik			DS Co							Disston
Firth-Sterling	Blue Chip	H.V. Blue Chip		Red Chip	Circle C		Star Blue Chip	FS 2-5			Firth-Sterling
Jessop	Supremus	Supremus Extra		Purple Label	Purple Label Extra	King Cobalt		Jessop T-8			Jessop
Latrobe	Electrite No. 1 XL	Electrite 19 XL	Electrite Vanadium MXL	Electrite Cobalt XL	Electrite Super Cobalt XL	Electrite Ultra Cobalt XL	Electrite U XL	Electrite UB XL		Electrite Dynavan XL	Latrobe
Simonds	Red Streak	Lockport Special		Tunco	Super Cobalt						Simonds
Universal-Cyclops	B-6	B-9		B-7	B-10			B-8			Universal-Cyclops
Vanadium-Alloys	Red Cut Superior	E.v.M.		Red Cut Cobalt	Red Cut Cobalt B	Gray Cut Cobalt				Vasco Supreme	Vanadium-Alloys
Vulcan	Wolfram Super			Wolfram Cobalt							Vulcan

HIGH SPEED TOOL STEELS

Molybdenum Base Types

Maker	M1	M2	M3	M4	M6	M7	M10	M15	M30	M34	M35	M36	Maker
Allegheny Ludlum	LMW	DBL2	DBL3			LMW-V	VLM		Super LMW			Super DBL	Allegheny Ludlum
Atlas	Mohican	Sixix	Atlas M3	Atlas M4			M-10						Atlas
Bethlehem	HMHS	66HS											Bethlehem
Braeburn	Mo Cut	Braemow	Braevan		Congo	Braeburn M7	Braeburn M-10		Coma				Braeburn
Carpenter	Star Max	Speed Star	Super Speed Star										Carpenter
Columbia		Molite	Molite 3				Molite 10						Columbia
Crucible	Rex TMO	Rex M2	Rex M3			Rex M7	Rex VM		Rex TMO-5	Rex TMO-8	Rex M2-5		Crucible
Disston		6N 6M-2											Disston
Firth-Sterling	Hi-Mo	Star Mo M-2	FSM-2½, Van Chip				FSM-10		Super Hi-Mo		Super Star Mo, M-25	Circle M	Firth-Sterling
Jessop	Mogul	Mustang	Jessop M-3				Jessop M-10						Jessop
Latrobe	Electrite Tatmo XL	Electrite Double Six XL	(1) Electrite Corsair XL, (2) Electrite Crusader XL			Electrite Tatmo V	Electrite TNW XL	Electrite Ultravan XL	Electrite Lacoma XL			Electrite CO-6 XL	Latrobe
Simonds	S. T. M.	Molva-T											Simonds
Universal-Cyclops	MoTung	MoTung 652	Unicut			MoTung GV	Mo Van	Super Unicut	Super MoTung	Super MoTung Special			Universal-Cyclops
Vanadium-Alloys	8-N-2	Vasco M-2	Van Cut	Neatro			Van-Lom	Vasco Supreme A	8-N-2 Cobalt				Vanadium-Alloys
Vulcan	Vulmo	TM-8											Vulcan

SPECIAL PURPOSE TOOL STEELS

Low Alloy Type

Maker	L1	L2	L3	L5	L6	L7	Maker
Allegheny Ludlum	Teten	Caroga Albany	.....	.....	Tioga	LSD, XCM	Allegheny Ludlum
Atlas	.....	.....	.....	.....	Ultimo 6	.....	Atlas
Bethlehem	Bearing Standard	Tough M	.....	.....	Bethalloy	Bearing Cr-Mo	Bethlehem
Braeburn	.....	.....	.....	.....	.....	Viking	Braeburn
Carpenter	.....	.....	.....	.....	R.D.S.	.....	Carpenter
Columbia	.....	.....	.....	.....	.....	Framdie	Columbia
Crucible	C-Cr	Halvan	.....	SS Extra	Champalloy	Halcomb SS tool	Crucible
Diaston	.....	.....	.....	.....	.....	.....	Diaston
Firth-Sterling	.....	Demmler D	AW Special	.....	.....	.....	Firth-Sterling
Jessop	.....	.....	.....	.....	.....	.....	Jessop
Latrobe	.....	Superb Crown	M Chrome	.....	NDS	.....	Latrobe
Simonds	.....	.....	.....	.....	.....	.....	Simonds
Universal-Cyclops	Alloy B	Orion	.....	14 MS	N-9	14 MS	Universal-Cyclops
Vanadium-Alloys	.....	Vanadium Types	Vanadium BB	.....	Nikro M	.....	Vanadium-Alloys
Vulcan	Superior Chrome	Auto	.....	.....	.....	Superior Chrome with Mo	Vulcan

COMPANY ADDRESSES

Allegheny Ludlum Steel Corp.
2020 Oliver Building
Pittsburgh 22, Pa.

Atlas Steels Limited
Welland, Canada

Bethlehem Steel Co.
Bethlehem, Pa.

Braeburn Alloy Steel Corp.
Braeburn, Pa.

Carpenter Steel Co.
Reading, Pa.

Columbia Tool Steel Co.
Lincoln Highway & State St.
Chicago Heights, Ill.

Crucible Steel Co. of America
P. O. Box 88
Pittsburgh 30, Pa.

Henry Diaston Div.
H. K. Porter Co.
Philadelphia 35, Pa.

Firth Sterling, Inc.
3113 Forbes St.
Pittsburgh 30, Pa.

Jessop Steel Co.
535 Green St.
Washington, Pa.

Latrobe Steel Co.
Latrobe, Pa.

Simonds Saw and Steel Co.
Lockport, New York

Timken Roller Bearing Co.
Canton 6, Ohio

Universal-Cyclops Steel Corp.
Universal Division
Bridgeville, Pa.

Vanadium-Alloys Steel Co.
Latrobe, Pa.

Vulcan Crucible Steel Co.
Aliquippa, Pa.

SPECIAL PURPOSE TOOL STEELS

	Carbon Tungsten Types			Low Carbon Types					Other	
Maker	F1	F2	F3	P1	P2	P3	P4	P6	P20	Maker
Allegheny Ludlum	.....	.....	.....	.....	.....	.....	.....	.....	FCC 6	Allegheny Ludlum
Atlas	.....	.....	.....	.....	.....	.....	.....	.....	.....	Atlas
Bethlehem	.....	BFS	.....	Duramold C	Duramold B	Duramold Ni-Cr	Duramold A	Duramold N	Multimold	Bethlehem
Braeburn	.....	Alloy Finishing	.....	.....	.....	.....	.....	.....	.....	Braeburn
Carpenter	.....	.....	K-W	.....	.....	.....	.....	.....	.....	Carpenter
Columbia	.....	.....	Double Special	.....	.....	.....	.....	.....	Plastic	Columbia
Crucible	Champion Extra	Double Special	Dental Burr	Crusca Cold Hubbing	Formold	.....	.....	Crusca 12B	CSM 2	Crucible
Diaston	.....	.....	.....	.....	.....	.....	.....	.....	.....	Diaston
Firth-Sterling	Meteor	R. T. Steel	.....	.....	.....	.....	.....	.....	.....	Firth-Sterling
Jessop	.....	Rapid Finishing	.....	.....	.....	.....	.....	.....	.....	Jessop
Latrobe	WT	.....	ESA	.....	.....	.....	.....	.....	.....	Latrobe
Simonds	.....	.....	.....	.....	.....	.....	.....	.....	.....	Simonds
Universal-Cyclops	Para	Saturn	.....	.....	.....	.....	.....	.....	.....	Universal-Cyclops
Vanadium-Alloys	.....	Colonial 4	.....	.....	.....	.....	.....	.....	.....	Vanadium-Alloys
Vulcan	.....	Regal	.....	Plastic Die	Vulmold	.....	.....	.....	.....	Vulcan

WATER HARDENING TOOL STEELS Symbol W

SHOCK RESISTING TOOL STEELS Symbol S

	Type W1	*Type W2*	*Type W3*	*Type W4*	*Type W5*	*Type W6*	*Type W7*	*Type S1*
C	.60-1.40	.60-1.40	1.00	.60-1.40	1.10	1.00	1.00	.50
Si								
Mn								
Cr				.25	.50	.25	.50	1.50
Ni								
Mo								
W								2.50
V		.25	.50			.25	.20	
Co								
Cb								
FORGING (a)								
Start forging at °F	1800-1950 (d)	1800-1950 (d)	1800-1950 (d)	1800-1950 (d)	1800-1950 (d)	1800-1950 (d)	1800-1950 (d)	1850-2050
Do not forge below °F	1500	1500	1500	1500	1500	1500	1500	1600
NORMALIZING (b) °F	1450-1700 (d)	1450-1700 (d)	1450-1700 (d)	1450-1700 (d)	1450-1700 (d)	1450-1700 (d)	1450-1700 (d)	Do not normalize
ANNEALING (c)								
Temperature °F	1360-1450 (d)	1360-1450 (d)	1360-1450 (d)	1360-1450 (d)	1360-1450 (d)	1360-1450 (d)	1360-1450 (d)	1450-1500
Rate of cooling, °F max. per hour	75	75	75	75	75	75	75	50
Approx. hardness, Brinell	159-202	159-202	163-202	159-202	163-202	163-202	163-202	183-229 (h)
HARDENING								
Rate of heating	Slowly (g)	Slowly (g)	Slowly (g)	Slowly (g)	Slowly (g)	Slowly (g)	Slowly (g)	Slowly
Preheat temperature °F								
Hardening temperature °F	1400-1550 (e)	1400-1550 (e)	1400-1550 (e)	1400-1550 (e)	1400-1550(e)	1400-1550 (e)	1400-1550 (e)	1650-1800
Time at temperature, minutes	10-30	10-30	10-30	10-30	10-30	10-30	10-30	15-45
Quenching medium	Brine or water	Brine or water	Brine or water	Brine or water	Brine or water	Brine or water	Brine or water	Oil
TEMPERING TEMPERATURE °F	300-650	300-650	300-650	300-650	300-650	300-650	300-650	400-1200
APPROX. HARDNESS, ROCKWELL C	65-50	65-50	65-50	65-50	65-50	65-50	65-50	58-40
DEPTH OF HARDENING	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Shallow	Medium
NONDEFORMING PROPERTIES	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Fair
SAFETY IN HARDENING	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Good
TOUGHNESS	Good (f)	Good (f)	Good	Good (f)	Good (f)	Good (f)	Good (f)	Very good
RESISTANCE TO SOFTENING EFFECT OF HEAT	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Fair
WEAR RESISTANCE	Fair to good	Fair to good	Fair to good	Fair to good	Fair to good	Fair to good	Fair to good	Fair*
MACHINABILITY	Best	Best	Best	Best	Best	Best	Best	Fair
RESISTANCE TO DECARBURIZATION	Best	Best	Best	Best	Best	Best	Best	Fair to good

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

*** If carburized, very good.**

	SHOCK RESISTING TOOL STEELS Symbol S				COLD WORK TOOL STEELS Symbol O, Oil Hardening Types			Symbol A, Medium Alloy Air Hardening Types
	Type S2	*Type S3*	*Type S4*	*Type S5*	*Type O1*	*Type O2*	*Type O7*	*Type A2*
C	.50	.50	.55	.55	.90	.90	1.20	1.00
Si	1.00		2.00	2.00				
Mn			.80	.80	1.00	1.60		
Cr		.75			.50		.75	5.00
Ni								
Mo	.50			.40				1.00
W		1.00			.50		1.75	
V								
Co								
Cb								
FORGING (a)								
Start forging at °F	1850-2050	1850-2050	1850-2050	1850-2050	1800-1950	1800-1925	1800-2000	
Do not forge below °F	1600	1600	1600	1600	1550	1550	1600	1850-2000
NORMALIZING (b) °F	Do not normalize	Do not normalize	Do not normalize	Do not normalize	1600	1550	1650	1650
ANNEALING (c)								Do not normalize
Temperature °F	1400-1450	1450-1500	1400-1450	1400-1450	1400-1450	1375-1425	1450-1500	
Rate of cooling, °F max. per hour	50	50	50	50	50	50	50	1550-1600
Approx. hardness, Brinell	192-217	183-212	192-229	192-229	183-212	183-212	192-217	40
HARDENING								202-229
Rate of heating	Slowly	Slowly	Slowly	Slowly	Slowly	Slowly	Slowly	
Preheat temperature °F	1200 (i)	1200 (i)	1200	1400	1200	1200	1200	Slowly
			W or B: 1600-1700	1600-1700			W: 1450-1525	1450
Hardening temperature °F	1550-1650	1500-1600	Oil: 1650-1750		1450-1500	1400-1475	O: 1550-1625	1700-1800
Time at temperature, minutes	Do not soak	10-30	Do not soak	Do not soak	10-30	Do not soak	10-30	20-45 (j)
Quenching medium	Brine or water	Brine or water	Oil or water	Oil	Oil	Oil	Oil or water	Air
TEMPERING TEMPERATURE °F	300-800	300-600	350-800	350-800	300-500	300-500	325-550	350-1000
APPROX. HARDNESS, ROCKWELL C	60-50	59-50	60-50	60-50	62-57	62-57	64-58	62-57
DEPTH OF HARDENING	Medium	Medium	Medium	Medium	Medium	Medium	Medium	Deep
			W: Poor				W: Poor	
NONDEFORMING PROPERTIES	Poor	Poor	O: Fair	Fair	Very good	Very good	O: Very good	Best
	Poor		W: Poor				W: Poor	Best
SAFETY IN HARDENING	Best	Poor	O: Good	Good	Very good	Very good	O: Very good	Fair
TOUGHNESS		Good	Best	Best	Fair	Fair	Fair	
RESISTANCE TO SOFTENING EFFECT OF HEAT	Fair	Fair	Fair	Fair	Poor	Poor	Poor	Fair
WEAR RESISTANCE	Fair	Fair	Fair	Fair	Good	Good	Good	Very good
MACHINABILITY	Fair	Fair	Fair	Fair	Good	Good	Good	Fair
RESISTANCE TO DECARBURIZATION	Poor	Fair	Poor	Poor	Good	Good	Good	Fair

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

COLD WORK TOOL STEELS

Symbol A, Medium Alloy Air Hardening Types — Symbol D, High Carbon-High Chromium Types

	Type A4	*Type A5*	*Type A6*	*Type D1*	*Type D2*	*Type D3*	*Type D4*	*Type D5*
C	1.00	1.00	.70	1.00	1.50	2.25	2.25	1.50
Si								
Mn	2.00	3.00	2.00					
Cr	1.00	1.00	1.00	12.00	12.00	12.00	12.00	12.00
Ni								
Mo	1.00	1.00	1.00	1.00	1.00		1.00	1.00
W								
V								
Co								3.00
Cb								
FORGING (a)								
Start forging at °F	1850-2000	1850-2000	1900-2050	1850-2000	1850-2000	1850-2000	1850-2000	1850-2000
Do not forge below °F	1650	1600	1600	1700	1700	1700	1700	1700
NORMALIZING (b) °F	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize
ANNEALING (c)								
Temperature °F	1360-1400	1360-1400	1350-1375	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650
Rate of cooling, °F max. per hour	25	25	20	50	50	50	50	50
Approx. hardness, Brinell	200-241	228-255	217-248	207-248	217-255	217-255	217-255	223-255
HARDENING								
Rate of heating	Slowly	Slowly	Slowly	Very slowly	Very slowly	Very slowly	Very slowly	Very slowly
Preheat temperature °F	1250	1100	1200	1500	1500	1500	1500	1500
Hardening temperature °F	1500-1600	1450-1550	1525-1600	1775-1850	1800-1875	1700-1800	1775-1850	1800-1875
Time at temperature, minutes	15-90	15-45	20-45	15-45 (j)	15-45 (j)	15-45 (j)	15-45 (j)	15-45 (j)
Quenching medium	Air	Air	Air	Air	Air	Oil	Air	Air
TEMPERING TEMPERATURE °F	300-800	300-800	300-800	400-1000	400-1000	400-1000	400-1000	400-1000
APPROX. HARDNESS, ROCKWELL C	62-54	60-54	60-54	61-54	61-54	61-54	61-54	61-54
DEPTH OF HARDENING	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
NONDEFORMING PROPERTIES	Best	Best	Best	Best	Best	Very good	Best	Best
SAFETY IN HARDENING	Best	Best	Best	Best	Best	Good	Best	Best
TOUGHNESS	Fair	Fair	Fair	Fair	Poor	Poor	Poor	Poor
RESISTANCE TO SOFTENING EFFECT OF HEAT	Fair	Fair	Fair	Fair	Good	Good	Good	Good
WEAR RESISTANCE	Good	Good	Good	Very good	Best	Best	Best	Best
MACHINABILITY	Fair to poor	Fair to poor	Fair to poor	Poor	Poor	Poor	Poor	Poor
RESISTANCE TO DECARBURIZATION	Good to fair	Good to fair	Good to fair	Fair	Fair	Fair	Fair	Fair

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

COLD WORK TOOL STEELS — Symbol D, High Carbon-High Chromium Types

HOT WORK TOOL STEELS — Symbol H — Chromium Base Types

	Type D6	*Type D7*	*Type H11*	*Type H12*	*Type H13*	*Type H14*	*Type H15*	*Type H16*
C	2.25	2.35	.35	.35	.35	.40	.40	.55
Si	1.00							
Mn								
Cr	12.00	12.00	5.00	5.00	5.00	5.00	5.00	7.00
Ni								
Mo		1.00	1.50	1.50	1.50		5.00	
W	1.00			1.50		5.00		7.00
V		4.00	.40	.40	1.00			
Co								
Cb								
FORGING (a)								
Start forging at °F	1850-2000	2050-2125	1950-2100	1950-2100	1950-2100	1950-2150	1900-2100	1950-2150
Do not forge below °F	1700	1800	1650	1650	1650	1700	1650	1700
NORMALIZING (b) °F	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize
ANNEALING (c)								
Temperature °F	1600-1650	1600-1650	1550-1650	1550-1650	1550-1650	1600-1650	1550-1600	1600-1650
Rate of cooling, °F max. per hour	50	50	50	50	50	50	50	50
Approx. hardness, Brinell	217-255	235-262	192-229	192-229	192-229	207-235	207-229	212-241
HARDENING								
Rate of heating	Very slowly	Very slowly	Moderately from Preheat	Moderately from Preheat	Moderately from Preheat	Moderately from Preheat	Rapidly from Preheat	Rapidly from Preheat
Preheat temperature °F	1500	1500	1500	1500	1500	1500	1500	1500
Hardening temperature °F	1700-1750	1850-1950	1825-1875	1825-1875	1825-1900	1850-1950	2100-2300	2050-2150
Time at temperature, minutes	15-45 (j)	30-60 (j)	15-40 (j)	15-40 (j)	15-40 (j)	15-40 (j)	Do not soak	Do not soak
Quenching medium	Oil	Air	Air	Air	Air	Air	Air or oil	Air or oil
TEMPERING TEMPERATURE °F	400-1000	300-1000	1000-1200	1000-1200	1000-1200	1100-1200	1100-1200	1050-1250
APPROX. HARDNESS, ROCKWELL C	61-54	65-58	54-38	55-38	53-38	47-40	49-36	60-45
DEPTH OF HARDENING	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
NONDEFORMING PROPERTIES	Very good	Best	Very good	Very good	Very good	Good	Air: Good Oil: Fair	Good
SAFETY IN HARDENING	Good	Best	Best	Best	Best	Best	Fair	Good
TOUGHNESS	Poor	Poor	Good	Good	Good	Good	Good	Good
RESISTANCE TO SOFTENING EFFECT OF HEAT	Good	Good	Good	Good	Good	Good	Good	Good
WEAR RESISTANCE	Best	Best	Fair	Fair	Fair	Fair	Fair	Fair
MACHINABILITY	Poor	Poor	Fair	Fair	Fair	Fair	Fair	Fair
RESISTANCE TO DECARBURIZATION	Fair	Fair	Fair	Fair	Fair	Fair	Poor	Fair

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

HOT WORK TOOL STEELS — Symbol H — Tungsten Base Types — Molybdenum

	Type H20	*Type H21*	*Type H22*	*Type H23*	*Type H24*	*Type H25*	*Type H26*	*Type H41*
C	.35	.35	.35	.30	.45	.25	.50	.65
Si								
Mn								
Cr	2.00	3.50	2.00	12.00	3.00	4.00	4.00	4.00
Ni								
Mo								8.00
W	9.00	9.00	11.00	12.00	15.00	15.00	18.00	1.50
V							1.00	1.00
Co								
Cb								
FORGING (a)								
Start forging at °F	1950-2150	1950-2150	1950-2150	1950-2150	1950-2150	1950-2150	1950-2150	1900-2050
Do not forge below °F	1650	1650	1650	1800	1750	1700	1750	1700
NORMALIZING (b) °F	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normaliz	Do not normalize
ANNEALING (c)								
Temperature °F	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650	1500-1600
Rate of cooling, °F max. per hour	50	50	50	50	50	50	50	50
Approx. hardness, Brinell	207-235	207-235	207-235	213-255	217-241	207-235	217-241	207-235
HARDENING								
Rate of heating	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat
Preheat temperature °F	1500	1500	1500	1550	1500	1500	1600	1350-1550
Hardening temperature °F	2000-2200	2000-2200	2000-2200	2200-2325	2000-2250	2100-2300	2150-2300	2000-2175
Time at temperature, minutes	2-5	2-5	2-5	2-5	2-5	2-5	2-5	Do not soak
Quenching medium	Air or oil	Air or oil	Air or oil	Air or oil	Air or oil	Air or oil	S, O or A	O, A or S
TEMPERING TEMPERATURE °F	1100-1250	1100-1250	1100-1250	1200-1500	1050-1200	1050-1250	1050-1250	1050-1200
APPROX. HARDNESS, ROCKWELL C	54-36	54-36	52-39	47-30	55-45	44-35	58-43	60-50
DEPTH OF HARDENING	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
NONDEFORMING PROPERTIES	Air: Good Oil: Fair	Air: Good Oil: Fair	Air: Good Oil: Fair	Air: Good Oil: Fair	Air: Good Oil: Fair	Air: Good Oil: Fair	Salt, air: Good Oil: Fair	Salt, air: Good Oil: Fair
SAFETY IN HARDENING	Good	Good	Good	Good	Good	Good	Good	Fair
TOUGHNESS	Good	Good	Good	Fair	Fair	Good	Fair	Poor
RESISTANCE TO SOFTENING EFFECT OF HEAT	Good	Good	Good	Very good	Very good	Very good	Very good	Very good
WEAR RESISTANCE	Fair to good	Fair to good	Fair to good	Fair to good	Good	Fair	Good	Good
MACHINABILITY	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair
RESISTANCE TO DECARBURIZATION	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Poor

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

HOT WORK TOOL STEELS Symbol H
Molybdenum Base Types

SPECIAL PURPOSE TOOL STEELS
Symbol F, Carbon Tungsten Types

HIGH SPEED TOOL STEELS
Symbol M, Molybdenum Base Types

	Type H42	*Type H43*	*Type F1*	*Type F2*	*Type F3*	*Type M1*	*Type M2*	*Type M3*
C	.60	.55	1.00	1.25	1.25	.80	.80	1.00
Si								
Mn								
Cr	4.00	4.00			.75	4.00	4.00	4.00
Ni								
Mo	5.00	8.00				8.00	5.00	5.00
W	6.00		1.25	3.50	3.50	1.50	6.00	6.00
V	2.00	2.00				1.00	2.00	2.70
Co								
Cb								
FORGING (a)	1900-2050	1900-2050				1900-2100	1900-2100	1900-2100
Start forging at °F	1700	1700	1800-2000	1800-2000	1800-2000	1700	1700	1700
Do not forge below °F	Do not normalize	Do not normalize	1550	1650	1650	Do not normalize	Do not normalize	Do not normalize
NORMALIZING (b) °F			1650	1650	1650			
ANNEALING (c)	1550-1650	1500-1600				1500-1600	1600-1650	1600-1650
Temperature °F	50	50	1400-1475	1450-1500	1450-1500	50	50	50
Rate of cooling, °F max. per hour	207-235	207-235	50	50	50	207-235	212-241	223-255
Approx. hardness, Brinell			183-207	207-235	212-248			
HARDENING	Rapidly from Preheat	Rapidly from Preheat				Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat
Rate of heating			Slowly	Slowly	Slowly			
Preheat temperature °F	1350-1550	1350-1550	1200	1200	1200	1350-1550	1350-1550	1350-1550
Hardening temperature °F	2050-2225	2000-2175	1450-1600	1450-1600	1450-1600	2150-2225 (l)	2175-2250 (l)	2200-2250 (l)
Time at temperature, minutes	Do not soak	Do not soak	15	15	15	2-5	2-5	2-5
Quenching medium	O, A or S	O, A or S	W or B	W or B	W, B or O	O, A or S	O, A or S	O, A or S
TEMPERING TEMPERATURE °F	1050-1200	1050-1200	300-500	300-500	300-500	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)
APPROX. HARDNESS, ROCKWELL C	60-50	58-45	64-60	66-62	66-62	65-60	65-60	66-61
DEPTH OF HARDENING	Deep	Deep	Shallow	Shallow	Shallow	Deep	Deep	Deep
NONDEFORMING PROPERTIES	Salt, air: Good Oil: Fair	Salt, air: Good Oil: Fair	Poor	Poor	Poor	Good	Good	Good
SAFETY IN HARDENING	Fair	Fair	Poor	Poor	Poor	Fair	Fair	Fair
TOUGHNESS	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor
RESISTANCE TO SOFTENING EFFECT OF HEAT	Very good	Very good	Poor	Poor	Poor	Very good	Very good	Very good
WEAR RESISTANCE	Good	Good	Good	Very good	Very good	Very good	Very good	Very good
MACHINABILITY	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair
RESISTANCE TO DECARBURIZATION	Fair	Poor	Good	Good	Good	Poor	Fair	Fair

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

HIGH SPEED TOOL STEELS Symbol M, Molybdenum Base Types

	Type M4	*Type M6*	*Type M7*	*Type M8*	*Type M10*	*Type M15*	*Type M30*	*Type M34*
C	1.30	.80	1.00	.80	.85	1.50	.80	.90
Si								
Mn								
Cr	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.00
Ni								
Mo	4.50	5.00	8.75	5.00	8.00	3.50	8.00	8.00
W	5.50	4.00	1.75	5.00		6.50	2.00	2.00
V	4.00	1.50	2.00	1.50	2.00	5.00	1.25	2.00
Co		12.00				5.00	5.00	8.00
Cb				1.25				
FORGING (a)								
Start forging at °F	1900-2100	1900-2100	1900-2100	1900-2100	1900-2100	1900-2100	1900-2100	1900-2100
Do not forge below °F	1700	1700	1700	1700	1700	1700	1700	1700
NORMALIZING (b) °F	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize
ANNEALING (c)								
Temperature °F	1600-1650	1600	1500-1600	1550-1600	1500-1600	1600-1650	1600-1650	1600-1650
Rate of cooling, °F max. per hour	50	50	50	25-30	50	50	50	50
Approx. hardness, Brinell	223-255	248-277	217-255	217-241	207-235	241-277	235-269	235-269
HARDENING								
Rate of heating	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat
Preheat temperature °F	1350-1550	1450	1350-1550	1500-1550	1350-1550	1500-1600	1350-1550	1350-1550
Hardening temperature °F	2200-2250 (l)	2150-2200 (l)	2150-2240 (l)	2200-2300 (l)	2150-2225 (l)	2175-2250 (l)	2200-2250 (l)	2200-2250 (l)
Time at temperature, minutes	2-5	2-5	2-5	2-5	2-5	2-5	2-5	2-5
Quenching medium	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S
TEMPERING TEMPERATURE °F	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1200 (k)	1000-1100 (k)	1000-1100 (k)
APPPOX. HARDNESS, ROCKWELL C	66-61	66-61	66-61	65-60	65-60	68-63	65-60	65-60
DEPTH OF HARDENING	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
NONDEFORMING PROPERTIES	Good	Good	Good	Good	Good	Good	Good	Good
SAFETY IN HARDENING	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair
TOUGHNESS	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor
RESISTANCE TO SOFTENING EFFECT OF HEAT	Very good	Very good	Very good	Very good	Very good	Best	Best	Best
WEAR RESISTANCE	Best	Very good	Very good	Very good	Very good	Best	Very good	Very good
MACHINABILITY	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair
RESISTANCE TO DECARBURIZATION	Fair	Poor	Poor	Fair	Poor	Fair	Poor	Poor

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

HIGH SPEED TOOL STEELS

Symbol M, Molybdenum Base Types — Symbol T, Tungsten Base Types

	Type M35	*Type M36*	*Type T1*	*Type T2*	*Type T3*	*Type T4*	*Type T5*	*Type T6*
C	.80	.80	.70	.80	1.05	.75	.80	.80
Si								
Mn								
Cr	4.00	4.00	4.00	4.00	4.00	4.00	4.00	4.50
Ni								
Mo	5.00	5.00						
W	6.00	6.00	18.00	18.00	18.00	18.00	18.00	20.00
V	2.00	2.00	1.00	2.00	3.00	1.00	2.00	1.50
Co	5.00	8.00				5.00	8.00	12.00
Cb								
FORGING (a)								
Start forging at °F	1900-2100	1900-2100	1950-2150	1950-2150	1950-2150	1950-2150	1950-2150	1950-2150
Do not forge below °F	1700	1700	1750	1750	1750	1750	1800	1800
NORMALIZING (b) °F	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize	Do not normalize
ANNEALING (c)								
Temperature °F	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650	1600-1650
Rate of cooling, °F max. per hour	50	50	50	50	50	50	50	50
Approx. hardness, Brinell	235-269	235-269	217-255	223-255	229-269	228-269	235-275	248-293
HARDENING								
Rate of heating	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat
Preheat temperature °F	1350-1550	1350-1550	1500-1600	1500-1600	1500-1600	1500-1600	1500-1600	1500-1600
Hardening temperature °F	2225-2275 (l)	2225-2275 (l)	2300-2375 (l)	2300-2375 (l)	2250-2325 (l)	2300-2375 (l)	2325-2400 (l)	2325-2400 (l)
Time at temperature, minutes	2-5	2-5	2-5	2-5	2-5	2-5	2-5	2-5
Quenching medium	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S	O, A or S
TEMPERING TEMPERATURE °F	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)
APPROX. HARDNESS, ROCKWELL C	65-60	65-60	65-60	66-61	65-60	66-62	65-60	65-60
DEPTH OF HARDENING	Deep	Deep	Deep	Deep	Deep	Deep	Deep	Deep
NONDEFORMING PROPERTIES	Good	Good	Good	Good	Good	Good	Good	Good
SAFETY IN HARDENING	Fair	Fair	Good	Good	Good	Fair	Fair	Fair
TOUGHNESS	Poor	Poor	Poor	Poor	Poor	Poor	Poor	Poor
RESISTANCE TO SOFTENING EFFECT OF HEAT	Best	Best	Very good	Very good	Very good	Best	Best	Best
WEAR RESISTANCE	Very good	Very good	Very good	Very good	Very good	Very good	Very good	Very good
MACHINABILITY	Fair	Fair	Fair	Fair	Fair	Fair	Fair	Fair
RESISTANCE TO DECARBURIZATION	Poor	Poor	Good	Good	Good	Fair	Poor	Poor

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

HIGH SPEED TOOL STEELS Symbol T, Tungsten Base Types

SPECIAL PURPOSE TOOL STEELS Symbol L, Low Alloy Types

	Type T7	*Type T8*	*Type T9*	*Type T15*	*Type L1*	*Type L2*	*Type L3*	*Type L4*
C	.75	.75	1.20	1.50	1.00	.50-1.10	1.00	1.00
Si								
Mn								.60
Cr	4.00	4.00	4.00	4.00	1.25	1.00	1.50	1.50
Ni								
Mo								
W	14.00	14.00	18.00	12.00				
V	2.00	2.00	4.00	5.00		.20	.20	.25
Co		5.00		5.00				
Cb								
FORGING (a)								
Start forging at °F	1950-2150	1950-2150	1950-2150	1950-2150	1800-2000	1800-2000	1800-2000	1800-2000
Do not forge below °F	1750	1750	1800	1800	1550	1550	1550	1550
NORMALIZING (b) °F	Do not normalize	Do not normalize	Do not normalize	Do not normalize	1650	1600-1650	1650	1650
ANNEALING (c)								
Temperature °F	1600-1650	1600-1650	1600-1650	1600-1650	1425-1475	1400-1450	1450-1500	1425-1475
Rate of cooling, °F max. per hour	50	50	50	50	50	Slowly in furnace	50	50
Approx. hardness, Brinell	217-255	228-255	235-277	241-277	179-207	163-196	174-201	179-207
HARDENING								
Rate of heating	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Rapidly from Preheat	Slowly	Slowly	Slowly	Slowly
Preheat temperature °F	1500-1600	1500-1600	1500-1600	1500-1600		W: 1450-1550	W: 1425-1500	
Hardening temperature °F	2300-2350 (l)	2300-2375 (l)	2275-2325 (l)	2200-2300 (l)	1450-1550	O: 1550-1700	O: 1500-1600	1475-1600
Time at temperature, minutes	2-5	2-5	2-5	2-5	10-30	10-30	10-30	10-30
Quenching medium	O, A or S	O, A or S	O, A or S	O, A or S	Oil or water	Oil or water	Oil or water	Oil or water
TEMPERING TEMPERATURE °F	1000-1100 (k)	1000-1100 (k)	1000-1100 (k)	1000-1200 (k)	300-600	300-1000	300-600	300-600
APPROX. HARDNESS, ROCKWELL C	65-60	65-60	66-61	68-63	64-56	63-45	64-56	64-56
DEPTH OF HARDENING	Deep	Deep	Deep	Deep	Medium	Medium	Medium	Medium
NONDEFORMING PROPERTIES	Good	Good	Good	Good	W: Poor O: Fair	W: Poor O: Fair	W: Poor O: Fair	W: Poor O: Fair
SAFETY IN HARDENING	Good	Fair	Fair	Fair	W: Poor O: Fair	W: Poor O: Fair	W: Poor O: Good	W: Poor O: Fair
TOUGHNESS	Poor	Poor	Poor	Poor	Fair	Very good (f)	Fair	Fair
RESISTANCE TO SOFTENING EFFECT OF HEAT	Very good	Best	Very good	Best	Poor	Poor	Poor	Poor
WEAR RESISTANCE	Very good	Very good	Best	Best	Good	Fair	Good	Good
MACHINABILITY	Fair	Fair	Fair	Fair	Good	Good	Good	Good
RESISTANCE TO DECARBURIZATION	Good	Fair	Good	Fair	Good	Good	Good	Good

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

SPECIAL PURPOSE TOOL STEELS

Symbol L, Low Alloy Types | Symbol P, Mold Steels | Low Carbon Types

	Type L5	*Type L6*	*Type L7*	*Type P1*	*Type P2*	*Type P3*	*Type P4*	*Type P5*
C	1.00	.70	1.00	.10	.07	.10	.07	.10
Si								
Mn	1.00		.35					
Cr	1.00	.75	1.40		2.00	.60	5.00	2.25
Ni		1.50			.50	1.25		
Mo	.25	.25*	.40		.20			
W								
V								
Co								
Cb								
		*At producer's option.						
FORGING (a)								
Start forging at °F	1800-2000	1800-2000	1800-2000	2200-2350 or 1450-1550*	1850-2050	1850-2050	1850-2050	1850-2050
Do not forge below °F	1550	1550	1550	1900 or 1250*	1550		1600	1550
NORMALIZING (b) °F	1650	1600	1650	Not required	Not required	Not required	Do not normalize	Not required
ANNEALING (c)								
Temperature °F	1425-1475	1400-1450	1450-1500	1350-1650	1350-1500	1350-1500	1600-1650	1550-1600
Rate of cooling, °F max. per hour	50	50	50	50	50	Slow in fce.	25	40
Approx. hardness, Brinell	183-223	183-212	183-212	81-100	103-123	109-137	116-128	105-110
HARDENING								
Rate of heating	Slowly	Slowly	Slowly					
Preheat temperature °F				1650-1700	1650-1700	1650-1700	1775-1825	1650-1700
Hardening temperature °F	1450-1600	1450-1550	1500-1600	1450-1475**	1525-1550**	1475-1525**	1775-1825**	1550-1600**
Time at temperature, minutes	10-30	10-30	10-30	15	15	15	15	15
Quenching medium	Oil	Oil	Oil	Water or brine	Oil	Oil	Air	Oil or water
TEMPERING TEMPERATURE °F	300-600	300-1000	300-600	300-500	300-500	300-500	300-500	300-500
APPROX. HARDNESS, ROCKWELL C	64-56	62-45	64-56	64-58***	64-58***	64-58***	64-58***	64-50***
DEPTH OF HARDENING	Medium	Medium	Medium	Shallow	Shallow	Shallow	Shallow	Shallow
NONDEFORMING PROPERTIES	Good	Good	Good	Poor	Good	Good		Good
SAFETY IN HARDENING	Good	Good	Good	Fair	Good	Good		Good
TOUGHNESS	Fair	Very good	Fair	Good	Good	Good		Good
RESISTANCE TO SOFTENING EFFECT OF HEAT	Poor	Poor	Poor	Poor	Poor	Poor	Fair	Poor
WEAR RESISTANCE	Good	Fair	Good	Good	Good	Good		Good
MACHINABILITY	Good	Fair	Good	Poor	Good	Fair		Fair
RESISTANCE TO DECARBURIZATION	Good	Good	Good	Good	Good	Good		Good

Refer to last page of this section for footnotes and explanation of letters O, A, S, B and W.

*** If carburized, very good.**
**** After carburizing.**
***** Carburized case hardness.**

SPECIAL PURPOSE TOOL STEELS

Symbol P, Mold Steels

	Low Carbon	Other
	Type P6	*Type P20*
C	.10	.30
Si		
Mn		
Cr	1.50	.75
Ni	3.50	
Mo		.25
W		
V		
Co		
Cb		
FORGING (a)		
Start forging at °F	1950-2150	1850-2050
Do not forge below °F	1700	1600
NORMALIZING (b) °F	Not required	1650
ANNEALING (c)		
Temperature °F	1550	1400-1450
Rate of cooling, °F max. per hour	30	50
Approx. hardness, Brinell	207	150-180
HARDENING		
Rate of heating		
Carburizing temperature °F	1650-1700	1600-1650
Hardening temperature °F	1450-1500**	1500-1600**
Time at temperature, minutes	15	15
Quenching medium	Oil	Oil
TEMPERING TEMPERATURE °F	300-450	300-500
APPROX. HARDNESS, ROCKWELL C	58-61***	64-58***
DEPTH OF HARDENING	Deep	Medium
NONDEFORMING PROPERTIES	Good	Good
SAFETY IN HARDENING	Good	Good
TOUGHNESS	Good	Good
RESISTANCE TO SOFTENING EFFECT OF HEAT	Fair	Poor
WEAR RESISTANCE	Good	Fair to good
MACHINABILITY	Fair	Good
RESISTANCE TO DECARBURIZATION	Good	Good

** After carburizing.
*** Carburized case hardness.

NOTES

a. The temperature at which to start forging is given as a range, the higher side of which should be used for large sections and heavy or rapid reductions, and the lower side for smaller sections and lighter reductions. As the alloy content of the steel increases, the time of soaking at forging temperature increases proportionately. Likewise, as the alloy content increases, it becomes more necessary to cool slowly from the forging temperature. With very high alloy steels, such as high speed steels and air hardening steels, this slow cooling is imperative in order to prevent cracking and to leave the steel in a semisoft condition. Either furnace cooling or burying in an insulating medium, such as lime, mica, or silocel, is satisfactory.

b. The length of time the steel is held, after being uniformly heated through at the normalizing temperature, varies from about 15 minutes for a small section to about 1 hour for large sizes. Cooling from the normalizing temperature is done in still air. The purpose of normalizing after forging is to refine the grain structure and to produce a uniform structure throughout the forging. Normalizing should not be confused with low temperature (about 1200° F) annealing used for the relief of residual stresses resulting from heavy machining, bending, and forming.

c. The annealing temperature is given as a range, the upper limit of wnich should be used for large sections and the lower limit for smaller sections. The length of time the steel is held, after being uniformly heated through at the annealing temperature, varies from about one hour for light sections and small furnace charges of carbon or low alloy tool steel, to about four hours for heavy sections and large furnace charges of high alloy steel.

d. Forging, normalizing, and annealing temperatures of carbon tool steels are given as ranges because they vary with carbon content. The following temperatures are recommended:

Forging
0.50 to 1.25% C: the range given
1.25 to 1.40% C: the low side of the range

Normalizing
0.60 to 0.75% C: 1500° F
0.75 to 0.90% C: 1450° F
0.90 to 1.10% C: 1600° F
1.10 to 1.40% C: 1600 to 1700° F

Annealing
0.60 to 0.90% C: 1360 to 1400° F
0.90 to 1.40% C: 1400 to 1450° F

e. Varies with carbon content as follows:
0.60-0.80% C: 1450-1550° F
0.85-1.05% C: 1425-1550° F
1.10-1.40% C: 1400-1525° F

f. Toughness decreases with increasing carbon content and depth of hardening.

g. For large tools and tools having intricate sections, preheating at 1050-1200° F is recommended.

h. For steel S1: for 0.25% silicon type, 183-207 Brinell; for 1.00% silicon type, 207-229 Brinell.

i. For steels S2 and S3: preferable for large tools to minimize decarburization.

j. Times given apply to open furnace heat treatment. For pack hardening a common rule is to heat for ½ hour per inch of cross section of the pack.

k. Double tempering recommended.

l. When the high temperature heating is carried out in a salt bath, the range of temperatures should be about 25° F lower than that given in this line.

O: Oil quench S: Salt bath quench
A: Air cool B: Brine quench
W: Water quench

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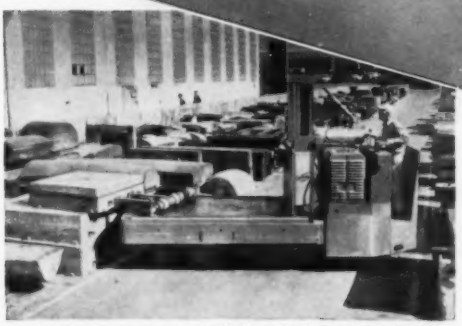
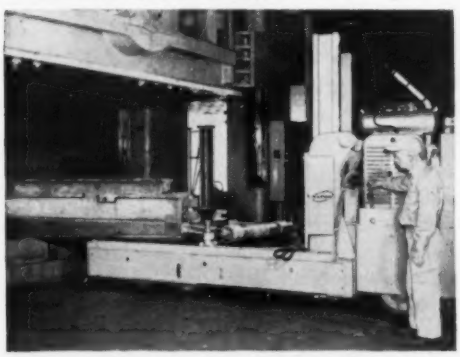


Note the narrow aisle in which the truck is operating. All wheel power steering makes maneuvering fast and easy.



Long, narrow die is turned 90° as it is pushed quickly off the truck onto the press bed. External sheaves or snatch blocks are not needed.

These are a few of the important features of the E-12 series die handlers that reduce press down time during die changing.

- Entirely new operating principle for close, positive contact with die. Eliminates time wasted rigging cables.
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New Technical Literature:

Catalogs and Bulletins

Conveyor idlers

A new ball bearing belt conveyor idler is described and pictured in Folder 2516. New from base to ball bearings, these Series 50 idlers are described as available in two types —greaseable and factory sealed— for seven belt widths ranging from 14 to 36 in. *Link-Belt Co.*

For free copy circle No. 1 on postcard, p. 189

Using metallic sodium

A brochure, "Handling Metallic Sodium On A Plant Scale", is now available. This sodium handling technology contains information such as details of typical sodium-using processes; details of equipment installation, insulation, etc.; recommendations for sodium pumping and instrumentation; recommendations for safety in design and operation. Text is interspersed with diagrams, tables and photographs to aid in visualization of the problems involved and their solutions. *U. S. Industrial Chemicals Co.*

For free copy circle No. 2 on postcard, p. 189

Rotary compressors

A line of tank mounted rotary compressors are described in a 4-page folder. Design and construction features including the manufacturer's use of multiple stage rotary compression are detailed and illustrated. In addition, specifications, physical dimensions and weights are included. *Davey Compressor Co.*

For free copy circle No. 3 on postcard, p. 189

Controller parts

Collected in one catalog is a reported compilation of all controller renewal parts for electric apparatus and motor controls. Various sections of the 96-page publication are devoted each to parts for the products of different manufacturers of this equipment. *Brownell Distributors, Inc.*

For free copy circle No. 4 on postcard, p. 189

FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 189.

Corrugated packings

Publication of a revised edition of "How To Ship More Economically in Corrugated Boxes" has been announced. Subjects treated in the new edition include design of a corrugated box, testing, storage, shipping room layout, packing, sealing, stacking and loading. Illustrations show the proper techniques involved in each of the operations with an eye to cost cutting in the packaging and shipping department. *Hinde & Dauch.*

For free copy circle No. 5 on postcard, p. 189

Cooling unit

Bulletin No. 130 explains the functions of an Aero After Cooler in removing moisture from compressed air and gas. The apparatus is described and illustrated with diagrams and photographs. Included also are diagrams and illustrations of the application of this equipment to air liquefaction systems. *Nigara Blower Corp.*

For free copy circle No. 6 on postcard, p. 189

Diecasting machines

A new, illustrated brochure gives a description of a line of diecasting machines. The brochure explains in detail the numerous features and technical advantages of this product line; describes a variety of die casting installations; as well as showing typical parts which can be run on the equipment. *Lester Phoenix, Inc.*

For free copy circle No. 7 on postcard, p. 189

Insulating equipment

"Thermobestos Pipe and Block Insulation" is the title of a new 12-page booklet just issued. It gives information on hydrous calcium silicate insulation for hot outdoor piping and process equipment operating at service temperatures up to 1200°F. The booklet tells how this product is made from asbestos, diatomaceous silica and lime. Additional features in this booklet are the sections on the pre-fabrication of fittings, physical and thermal properties and tables of available sizes and thicknesses. Included, too, are complete heat transmission tables for both pipe and block insulation. *Johns-Manville.*

For free copy circle No. 8 on postcard, p. 189

Product summary

A condensed catalog of 52-pages show one firm's complete line of tools with prices and all dimensions. Included are drills, reamers, counterbores, countersinks and special tools. The book contains technical data tools made of high speed, carbon steel and carbide and for use in steel, wood, concrete and glass. *Chicago-Latrobe.*

For free copy circle No. 9 on postcard, p. 189

Cast iron repairing

A new, illustrated 4-page booklet entitled, "The Repair of Cast Iron Parts," has recently been issued. It outlines information on the welding of cast iron with one firm's products. Nine case histories show these welding electrodes in action. *International Nickel Co., Inc.*

For free copy circle No. 10 on postcard, p. 189

Roll formed shapes

An illustrated story of the production of roll formed shapes is told in a new 26-page Catalog (No. 1555). Processes shown include the notching, punching and cutting to length of special shapes in one continuous operation. The new catalog also contains drawings and dimensions of more than 100 simple and complex shapes, Lockseam and butted tubing, angles and channels now being produced. Charts provide quick reference to dimensions of standard round Lockseam and butted tubing. *Roll Formed Products Co.*

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CHICAGO TRAMRAIL

TRAK-RAK cuts cost of

BAR STOCK HANDLING 66.3%

employing 2 men where 4 were formerly required . . . with 100% selectivity of material

An improved, simplified, and radically different method of handling bar stock is now in use which replaces the usual difficult and costly method of storing bar stock in pigeon hole racks and removing only a bar or two at a time.

Utilizing the TRAK-RAK Crane System, bar stock is assembled in unit loads placed in containers or baskets which are stored in fabricated tree-type racks on each side of narrow aisles. To remove one or more bars, the container is lowered to the floor, the bars removed and the container with the remaining bar stock placed back in its designated location in the storage racks. The entire movement is one-man, pendant push-button controlled from the floor and it is now possible for the saw man to select his own material and place it directly upon the saw table.

This TRAK-RAK Crane System operates in a 4 ft. 6 in. aisle and stores the material eleven high. The same crane incorporates interchangeable forks which allows the crane to handle palletized material as well as bar stock in the same area.

Write today for TRAK-RAK applications—a 20-page illustrated booklet explaining the TRAK-RAK Handling and Storage System; illustrates and describes installations for handling many diverse materials in fourteen widely different industries.

CHICAGO TRAMRAIL CORPORATION

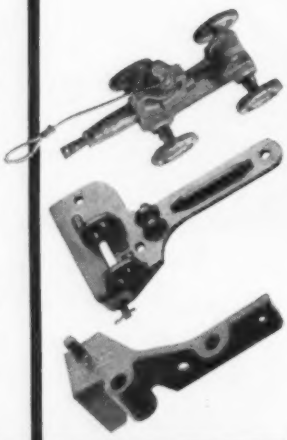
1312 SO. KOSTNER AVENUE • CHICAGO 23, ILLINOIS

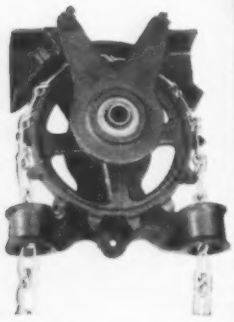
How About Malleable?

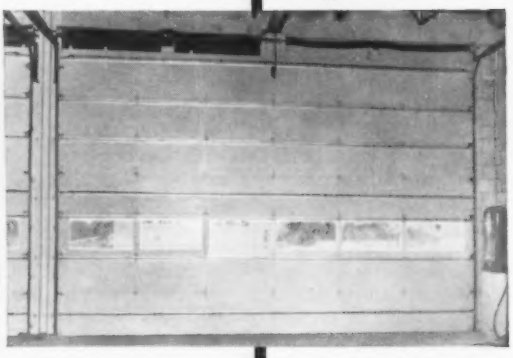
"Sturdiness and permanence pay," says a leading overhead door manufacturer.

Here is another manufacturer using malleable iron castings to improve his product. Malleable is noted for its tough strength, wear resistance, and ability to be produced in intricate shapes close to final form. Its excellent machinability, where machining is required, means trouble-free and low-cost finishing.

This versatile material has been utilized for 130 years in a wide range of applications and in every industrial field.







Call a malleable foundry and review your products with their engineers. They can often give you valuable suggestions. Or write to the Malleable Founders' Society.

Parts photos by courtesy of Quincy Mfg. Co., Tiffin, Ohio

1800 Union Commerce Building Cleveland 14, Ohio

FREE TECHNICAL LITERATURE

Chemical rubber

Suggestions on how to obtain rubber products with greater resistance to deterioration are given in a new, 8-page publication which tells how chemical rubber has reportedly solved problems in product design and plant maintenance. The booklet touches on the composition and manufacture of this new synthetic rubber, outlines its characteristics and shows by examples how these properties have proved advantageous to users of hose, belting, seals, coatings, and other rubber products. *Elastomers Div., E. I. du Pont de Nemours & Co.*

For free copy circle No. 12 on postcard, p. 189

Magnetic separator

A new technical sheet is available on one firm's principle of magnetic separation. The new separator is described as using a flat magnetic field instead of a drum. The liquid flow is on top of the magnets and gravity action assists the magnets in attracting ferrous particles and sludge from the liquids. The literature gives dimensions and capacities on 3 separator models with drag-out system, with collector tank and without tank. *Industrial Filtration Co.*

For free copy circle No. 13 on postcard, p. 189

Stripping paint

Paint removal by the application of alkaline or solvent materials is the subject of a recently revised booklet "How to Strip Paint." The booklet describes the procedures followed in four different stripping methods—steam gun, hot flow-on, cold spray and tank. It tells which materials should be used for specific types of paint, enamel, and lacquer. The booklet also discusses ways to protect stripped parts from rust in storage. *Oakite Products, Inc.*

For free copy circle No. 14 on postcard, p. 189

Refrigerating

An 8-page, illustrated 2-color catalog (Bulletin 1426) describes a single-stage hermetic centrifugal refrigerating machine. The new bulletin includes a cut-away photograph showing the various construction details. *American Blower Corp.*

For free copy circle No. 15 on postcard, p. 189

FREE TECHNICAL LITERATURE

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

This section starts on p. 186

Shellcasting

"Reduce Production Costs with Shellcast," is the title of a new, 12-page, 3-color brochure just released covering shellcast facilities and products. Information intended to be of value to design and production engineers, purchasing agents and other casting users has been included. Advantages reported through the use of shellcastings described in the new brochure include good reproduction detail, reduction of weight and conservation of material, castings of close dimensional tolerance and reduction of machining costs. *Electric Steel Foundry Co.*

For free copy circle No. 16 on postcard

Tooling plate

Two tooling materials—Pioneer 921-T cast from specially alloyed aluminum ingots—and Pioneer F-66—cast from specially alloyed zinc ingots—are among the products described in a new folder. Other company products—chucks, pumps, lay-up molds, and cast aluminum heating platens—are also detailed and illustrated. *Pioneer Tool Eng., Inc.*

For free copy circle No. 17 on postcard

Company profile

A 48-page, illustrated brochure has been prepared to give a picture and word "visit" with one manufacturer and explain the firm's "organization, facilities, products, purposes, experiences and policies." The company is engaged in creating equipment for the surface treating of metals. Their line of products is illustrated and described. *N. Ransohoff, Inc.*

For free copy circle No. 18 on postcard

Grit abrasive

Catalog information is available on a controlled size, shape and grit abrasive media for precision barrel finishing. The product is described as providing a special compounding of quality synthetic rubber and pure aluminum oxide to result in media that allows abrasive action in the most remote corners and recesses of a part without fear of chipping, splintering or cracking into odd shapes and sizes that lodge in blind or threaded holes or difficult-to-get-at recesses. Available in a wide range of popular sizes and grits, these "Speed-D-Burretts" are mentioned as permitting the user to choose exactly the right size, shape and grit to fit each and every specific part to be finished. *Speed-D-Burr Corp.*

For free copy circle No. 19 on postcard

Coolant aerator

A 2-page folder has been prepared to show how an aerator can be used to eliminate coolant splash. Detailed description is given of the unit which connects to the coolant line and mixes atmospheric air with coolant to provide a non-splash aerated mixture designed to cling to work and tools. Specifications are included. *Melard Mfg. Corp.*

For free copy circle No. 20 on postcard

Automatic riveter

An automatic riveter described as easily operated with one hand and from any necessary angle is discussed and illustrated in a 4-page folder. Operating sequence for the unit, types of rivets used and applications are detailed. *Aviation Developments, Inc.*

For free copy circle No. 21 on postcard

Postcard valid 8 weeks only. After that use own letterhead fully describing item wanted. 3/8/56

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FIRST CLASS
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New York, N. Y.

BUSINESS REPLY CARD
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THE IRON AGE
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Your Name

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Company

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FREE TECHNICAL LITERATURE

Deburring tool

Information is available on the "Ellipti-Burr", a newly designed, specially engineered tool for the deburring and chamfering of openly accessible hole faces having irregular surfaces. The new unit is described as providing a tool which is self-piloting and a two-lipped cutter which automatically accommodates and follows the hole surface geometry. The pilot is conical, and the maker states and accommodates any hole size within its working range. *Nobur Mfg. Co.*

For free copy circle No. 22 on postcard

Electroplating

A chart designed to be invaluable in cost computing and other operations connected with precious metal electroplating is being distributed. Its purpose is to save the electroplater some of the time usually consumed in consulting various tables. The chart provides at a glance all related and comparative data on gold, rhodium, palladium, platinum, silver and nickel. *Technic Inc.*

For free copy circle No. 23 on postcard

Spring motors

Publication of data for the design of Neg'ator constant-torque spring motors is announced by the manufacturer. The illustrated, 25-page booklet discusses the general principles, physical and operational characteristics, typical applications, and application limitations of this mechanical motor. Complete design procedure and formulas are explained. *Hunter Spring Co.*

For free copy circle No. 24 on postcard

Overhead handling

A new, illustrated, 6-page booklet tells how overhead handling systems are used at a metal company's plant and warehouse. The report shows, by means of photographs and diagrams, how these engineered systems keep things moving from receiving, through production, to storage and shipping. One of the operations described is in the shipping department where fast, efficient rack-to-truck movement helps speed delivery. *Whiting Corp.*

For free copy circle No. 25 on postcard

Air cylinders

A complete line of cylinders, valves, clamps and dial feed indexing tables is featured in a new illustrated catalog. Described are a complete range of valve-in-head, single and double ended cylinders; solenoid, pilot and hand air valves; spring return clamp and 3 different models of dial feed tables. These bulletins, together with price sheets, are spiral bound into a master catalog. *A. K. Allen Co.*

For free copy circle No. 26 on postcard

Wire baskets

Literature is available on the addition of wire baskets to a firm's line of parts handling equipment. Number of standard sizes offered, according to the material, range from 18 in. x 10 in. x 3 in. to 24 in. x 14 in. x 12 in. In addition, the company states facilities are available for fast, economical design and production of special baskets and inserts to meet individual requirements. *Chas. Wm. Doepke Mfg. Co.*

For free copy circle No. 27 on postcard

Pressure die castings

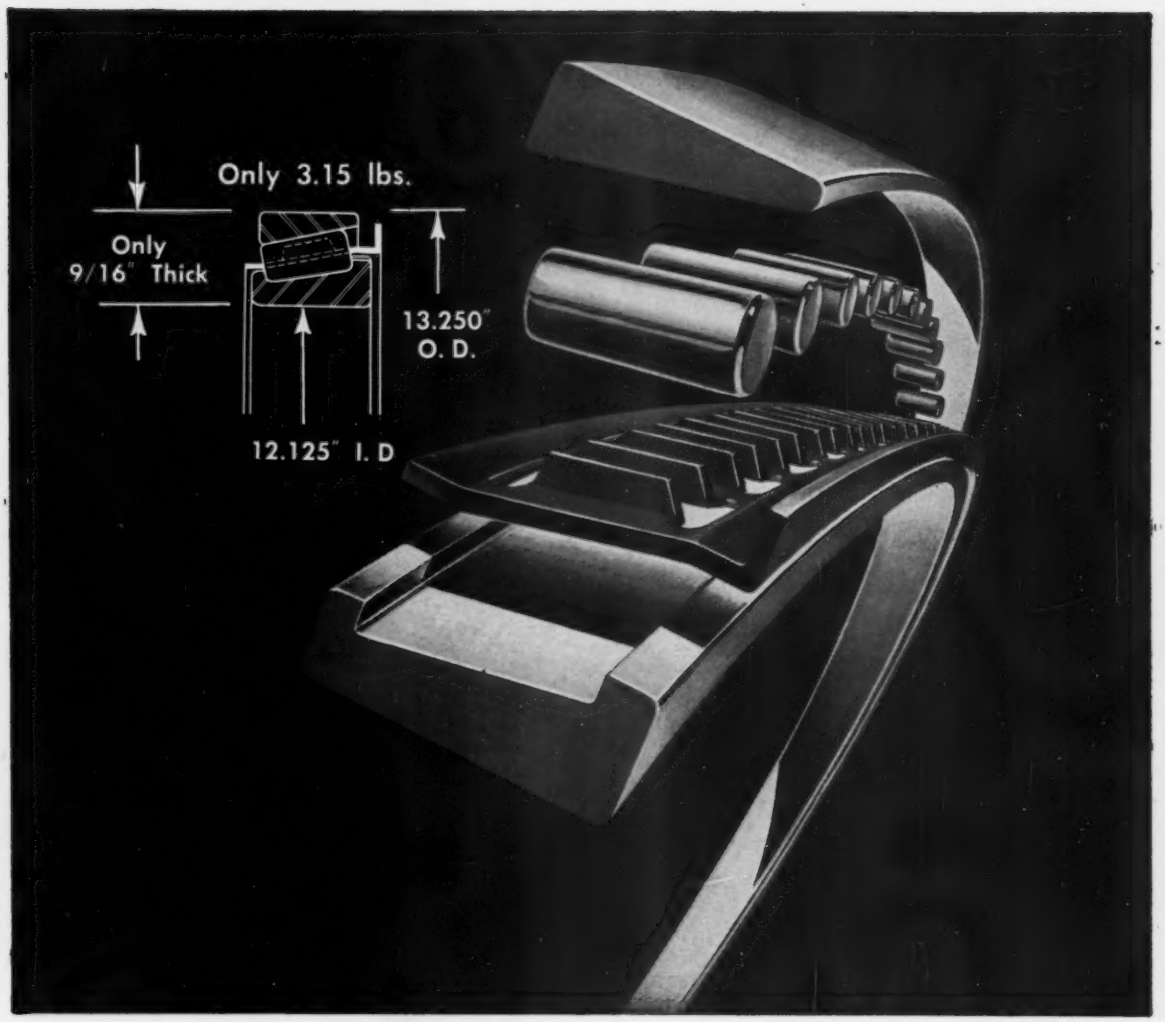
Design data outlining the uses of brass pressure die castings as fabricated assembly parts is contained in a new 4-page folder. Advantages of pressure die castings are discussed, and compositions and properties of pressure die castings are given. The folder also describes briefly how this manufacturer makes brass pressure die castings. *Titan Metal Mfg. Co.*

For free copy circle No. 28 on postcard

Stainless strip

Technical information on 20 types of stainless strip steel are in a new 32-page brochure. The various types are analyzed to present recommended applications; general description; chemical, physical and mechanical properties; and corrosion resistance. Also included are two sets of tables—one on physical and mechanical properties of various metals and alloys, the other on weight per lineal foot of strip steel of various thicknesses and widths. *Superior Steel Corp.*

For free copy circle No. 29 on postcard



Kaydon...

world's thinnest tapered roller bearings

Reali-Slim — that's the name we've given our line of extremely thin-section, lightweight bearings. The bearing shown above is a *Reali-Slim*. *Reali-Slim* bearings are really strong, too! The single row, tapered roller bearing we're talking about, here, has a 33,000-lb. radial capacity—with 38,200-lb. thrust capacity. Over 1-ft. in diameter, yet it weighs only 3.15 lbs! These figures tell how *Reali-Slim* bearings combine minimum section with high strength and long life.

If you're looking for a whole new concept in thin-section, lightweight bearing design — look at Kaydon's *Reali-Slim* line. In addition to hundreds of *Reali-Slim* standard sizes, there's a big variety of special races and separators to meet special applications. Kaydon engineers are prepared to give you valuable help with your application problems.

For more information write Kaydon of Muskegon. Ask for engineering Catalog No. 54RS-1 detailing:

★ ***Reali-Slim Ball Bearings*** — in Conrad, angular contact and 4-point contact types are available in seven standard cross sections from ¼" to 1.000" and in bore diameters from 4" to 40.000".

★ ***Reali-Slim Roller Bearings*** — in radial and taper roller types are available in cross sections from 9/16" and in bore diameters from 5" to 40.000".

K-552

THE KAYDON ENGINEERING CORP.

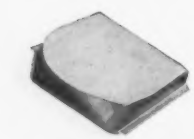
MUSKEGON • MICHIGAN

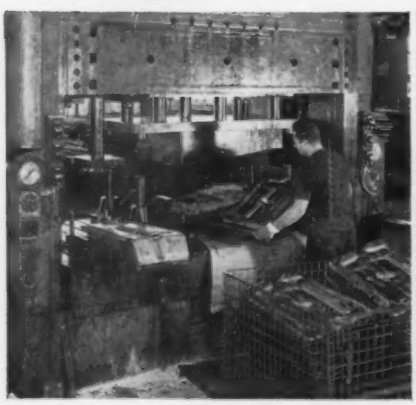
All types of ball and roller bearings — 4" to 120" outside diameter . . .
Taper Roller • Roller Thrust • Roller Radial • Bi-Angular Roller • Spherical Roller • Ball Radial • Ball Thrust Bearings.'

For Deep Drawn Parts ... H-P-M

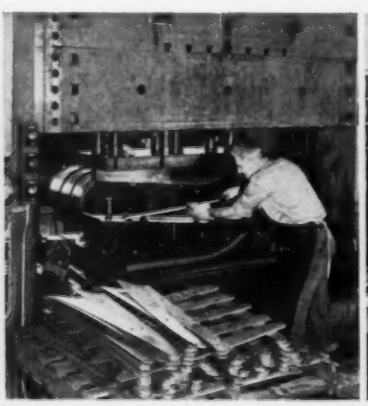
H-P-M Hydraulics Prove Their Versatility At Massey-Harris-Ferguson, Inc.

These three big H-P-M presses (the third just recently installed) are doing a "bang-up" job drawing deep, intricate parts for the famed Massey-Harris-Ferguson line of tractors and farm equipment. As a result the number of drawing operations has been greatly reduced, thus speeding up production . . . fewer dies, less press equipment, smaller factory space and less manpower have cut factory overhead. Due to their great versatility, these presses are used for all types of shallow and deep drawn parts and for short or long runs.





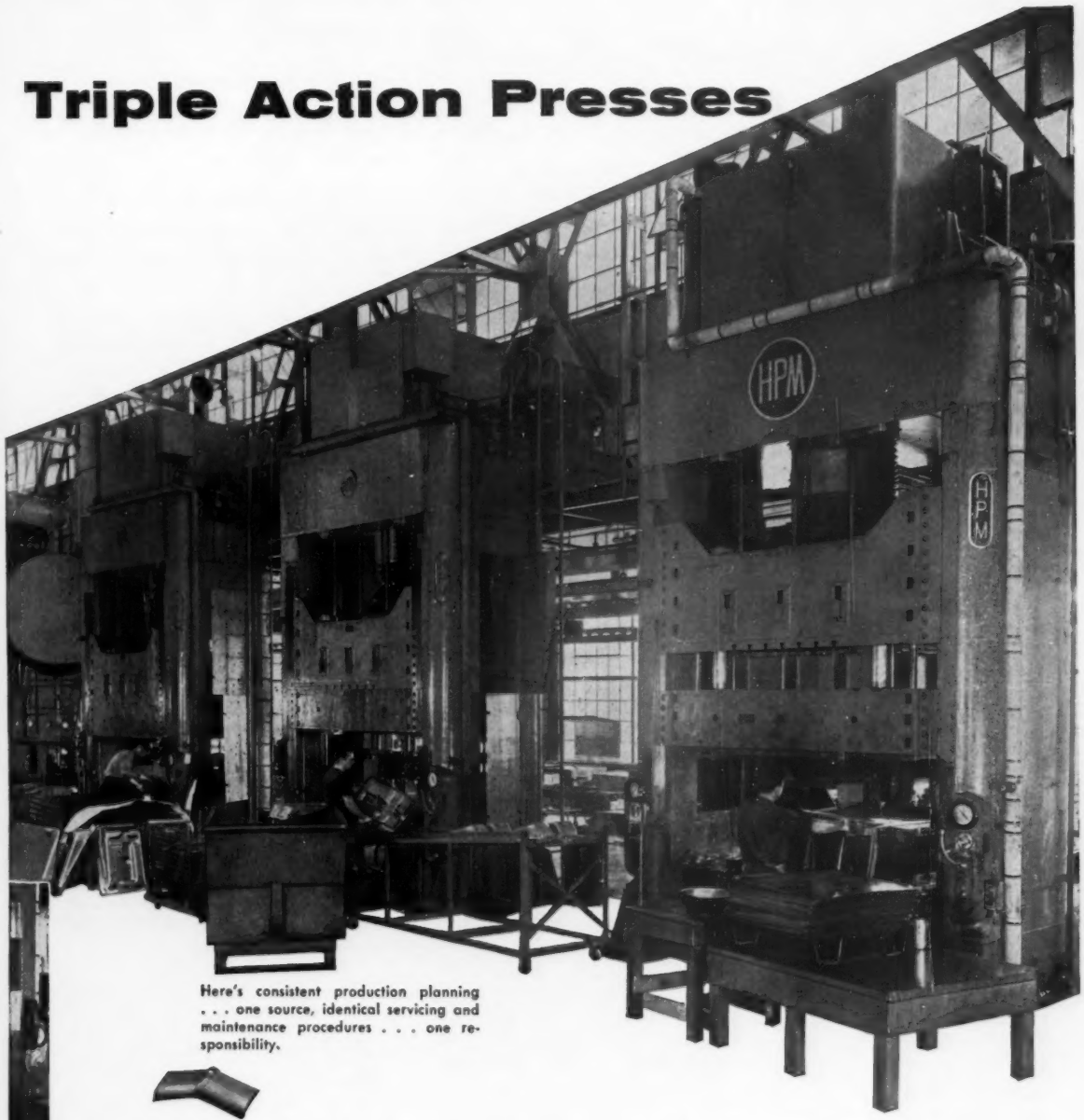
Two dies used simultaneously; at right, flange contour is trimmed while at left hole is punched in shallow end.



This die first forms fender brackets to desired shape and then forms flange into channel section—strong and rigid—in the same press stroke.

The fuel tank is drawn by this H-P-M. This 18 gauge part is sent to another trimming press by chute at left . . . one draw and the part is formed.

Triple Action Presses



Here's consistent production planning . . . one source, identical servicing and maintenance procedures . . . one responsibility.

Here's why H-P-M presses really pay off . . .H-P-M's fastraverse closed circuit system provides constant and controllable drawing speed . . . smooth, fast action without impact . . . independent pressure adjustments of punch, blankholder and die cushion . . . positive blankholder pressure for entire length of draw . . . shockless reversal. With H-P-Ms, you have positive overload protection . . . there's no chance of breakage . . . press reverses at predetermined position or pressure. H-P-Ms also permit quicker die set up. You, too, can eliminate the guesswork . . . choose H-P-Ms for all your metalworking needs. Write today for complete information.

METAL WORKING DIVISION
THE HYDRAULIC PRESS MFG. CO.
Mount Gilead, Ohio, U.S.A.

HPM

Hyde Park
RED CIRCLE Rolls ALLOY-CHILLED

Rolling Mill Equipment

For more than 50 years Hyde Park Steel Mill equipment has been helping American industry lead the world—equipment such as—

Bar Mills
Merchant Mills
Sheet and Strip Mills
Pinion Stands
Roller Tables
Reduction Drives
Stretcher Levellers
Guillotine Shears
Sheet Mill Shears
Roll Lathes
Special Machinery
Machine Work

For finer finish, long life and greater tonnage, specify Red Circle Rolls.

Hyde Park
FOUNDRY & MACHINE CO.
Hyde Park, Westmoreland Co., Pa.
ROLLS
ROLLING MILL MACHINERY
GREY IRON CASTINGS

Tool Engineers' Show

Chicago welcomes the 24th American Society of Tool Engineers Show and Industrial Exposition . . . Each day packed with discussions of new materials and processes.

Tool engineers, production people and executives may expect a field day at the 1956 American Society of Tool Engineers Show and Industrial Exposition. It will be held in Chicago's International Amphitheatre from Monday, March 19, through Friday, March 23.

More than 500 leading firms will display their products and processes at the show. Inspection visits are planned to local plants every day, with some dozen firms opening their doors.

Symposiums and technical sessions abound with papers on all aspects of tooling. Tool engineers from large and small firms will deliver 50-odd reports describing their efforts and results in many fields.

Industrial conferences will run continuously from early morning until mid-evening.

Meetings and symposiums will be grouped for the convenience of out-of-towners. Monday, March 19, conferences will concern themselves with new materials, including ceramic cutting and shaped diamond tools. Tuesday's sessions will emphasize tool research and touch on what may be expected soon from the laboratories. On Wednesday, March 21, advances in processing will be discussed. Applied tool management will be the major topic Thursday, March 22. Tool engineering will be Friday's purpose, and will include papers on standards, gaging and productivity.

ASTE TECHNICAL PROGRAM

All meetings, unless otherwise specified, will be held in room A, B or C, located on the second floor of the North Hall at the International Amphitheatre.

Monday, March 19—1:30 p.m.

Ceramic Tooling Brought Up to Date—W. B. Kennedy, Chief, Experimental Machining Branch, Rodman Laboratory, Watertown Arsenal.

Cemented Borides for Tool Materials—A. G. Metcalfe, Senior Metallurgist, Armour Research Foundation.

Monday, March 19—2:30 p.m.

The Drawing of Titanium—J. S. Kirkpatrick, Vice President, Brooks & Perkins, Inc.

Machining With Silent Sound—Jack Welch, Manager, Machine Tool Division, The Sheffield Corp.

Monday, March 19—3.30 p.m.

Recent Advances in Grinding Wheels

Precision Production Grinding Machines—A. H. Dall, Director of Standard Machine Tool Engrg., The Cincinnati Milling Machine Co.

Electrical Discharge Grinding of Tools—V. E. Matulaitis, Director of Research, Elox Corp. of Michigan.

Monday, March 19—6:30 p.m.

Master of Ceremonies: Dr. D. J. Rettaliata, President, Illinois Institute of Technology.

Man-Made Diamonds—J. S. Gillespie, Manager, Diamond Project, Carboloy Dept., General Electric Co.

Tuesday, March 20—9:30 a.m.

Crystallography and Grinding Hardness of the Diamond Crystal—Dr. J. F. H. Custers, Director of Research, Diamond Research Laboratory.

The Selection, Division and Shaping of Diamond for the Manufacture of Diamond Tipped Tools—R. G. Weavind, Director of Research, Diamond Research Laboratory.

Some Aspects of the Batch Production of Diamond Tools—N. R. Smith, Director, L. M. Van Moppes and Sons, Ltd.

PROGRAM

Tuesday, March 20—9:30 a.m.

The Tool Engineer's Function in Numerical Control—J. Daugherty, Vice President — Engineering, Giddings & Lewis Machine Tool Co.

The Use of Punched Cards for Machine Control—J. J. Jaeger, Vice President, Chief Engineer—Machinery Division, Pratt & Whitney Co., Inc.

Tuesday, March 20—10:30 a.m.

The Case for Buying Machine Tools—George Terborgh, Research Director, Machinery & Allied Products Institute.

Economics of Replacing Machine Tools by Equipment Rental—F. J. Trecker, President, Kearney & Trecker Corp.

Tuesday, March 20—1:30 p.m.

Diamond Dressing of Form Grinding Wheels—Jack Bryant, Process Engineer, Allis-Chalmers Manufacturing Co.

Shaped Tools for Form Grinding From the Manufacturers' View Point—J. B. Speirs, Chief Engineer, American Coldset Corp.

Suggested Standards for Diamond Tool Shanks—Martin Hoerer, Vice President, Golconda Corp.

Tuesday, March 20—2:30 p.m.

Advantages of Plastic Tooling—Fred Lyijynen, Supervisor, Plastics Development Dept., Auto Body Division, Chrysler Corp.

Interview Panel: John Mickey, Manager, Research Dept., Ford Motor Co.; Robert H. Voss, President, Warren Plastics & Engrg. Inc.; E. R. Kalis, General Foreman, Fisher Body Div., GMC.

Tuesday, March 20—3:30 p.m.

Why Register—Paul H. Robbins, P. E., Executive Director, National Society of Professional Engrs.

How to Become A Registered Professional Engineer — John D. Constance, P. E.

Tuesday, March 20—8:00 p.m.

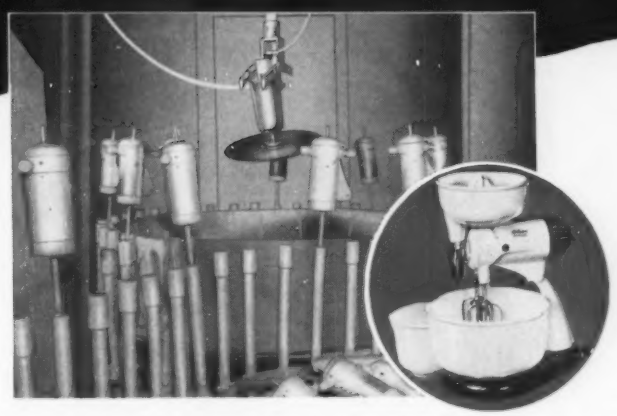
Methods of Applying Cutting Fluids —Prof M. C. Shaw and Prof. P. A. Smith, Machine Tool Laboratory, Massachusetts Institute of Technology.

Metal - Cutting Evaluation — F. J. Daasch, Chief Machinability Engineer, Rock Island Arsenal Laboratory.

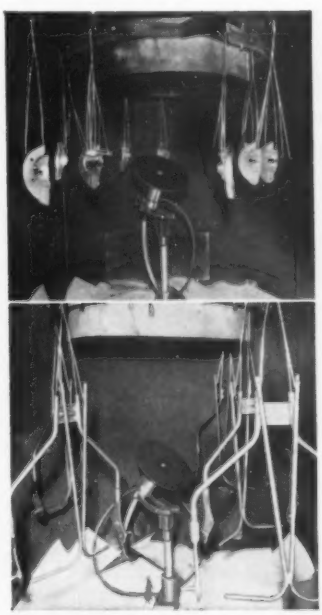
Sunbeam is particular about the uniform high quality finish on their products, so SUNBEAM relies on

RANSBURG NO. 2 PROCESS

Electrostatic Spray Painting



Along with improving the quality of the brilliant white finish on Mixmaster parts, an 80% paint savings was achieved when SUNBEAM switched from hand spray to RANSBURG Electrostatic Spray Painting



Protective clear lacquer is applied to upper saw guard (upper left) with RANSBURG NO. 2 PROCESS on this line in SUNBEAM's plant 2, Chicago. Other hardware items, including the Drillmaster and Sunbeam Sander are lacquer-coated electrostatically here. Lawn mower parts, such as the handles shown (lower left), the Rain King lawn sprinkler base, and the Sunbeam Fryer base also are painted efficiently with Ransburg No. 2 Process Electro-Spray.

Regardless of the type of product you manufacture, if it's painted—and if your production justifies conveyorized painting—you should look into the savings and improved quality which can be yours with one of the Ransburg Electrostatic Processes. May we tell you about complete Ransburg services, including the test painting of your products in our laboratories?

Ransburg ELECTRO-COATING CORP.

Indianapolis 7, Indiana

RANSBURG

Meeting Today's Needs with Research . . .

Chief Sandusky

FERROUS AND NON-FERROUS CENTRIFUGALLY CAST ROLLS, SLEEVES, TUBES, LINERS, CHUTES, RETORTS, RINGS, BUSHINGS, BEARINGS, ETC.

Here you'll find a skilled staff in completely equipped laboratories testing new materials, developing new processes, helping to make better castings for your specific requirements.

These improvements are directly translated into uniform, strong, close-grained ferrous and non-ferrous castings with extreme resistance to corrosion, heat, and abrasion. As another service, the Chief offers machining facilities for turning, boring, and drilling.

Bring your casting problems to the Chief's thoroughly trained specialists. These men are always available to apply their broad experience to your particular needs.

C. M. Lovsted & Co., Seattle, Wash. • Tynes Bros., Birmingham, Ala. • Cordes Bros., San Francisco and Wilmington, Calif.

Chief SANDUSKY CENTRIFUGAL CASTINGS

FERROUS AND NON-FERROUS

SANDUSKY FOUNDRY AND MACHINE CO., Sandusky, Ohio

PROGRAM

Tuesday, March 20—8:30 p.m.
Waldorf Room, Conrad Hilton

Machining Carbide Dies by the Electrical Discharge Method—J. K. Carroll, Executive Vice President, Electrosize, Inc.

How to Help the Die Builder Give You Satisfaction—H. Harig, President, Harig Manufacturing Corporation.

What the Strip Steel Manufacturer Should Know—Burton E. Longwell, Asst. Manager of Sales, Republic Steel Corp., Sheet & Strip Division.

The Die Builder Asks for Help—Don E. Oberg, President & General Manager, Oberg Manufacturing Co., Inc.

Application of Cemented Tungsten Carbide for Dies—P. F. Rehner, Manager of Sales, Carmet Division, Allegheny Ludlum Steel Corp.

The Stamper and Die Building—Thomas C. Roberts, President, Kobzy Tool Co.

Wed., March 21—9:30 a.m.

Use of Industrial Diamond and Diamond Tools in Industry—D. J. Wallace, Vice President, Wheel Truing Tool Co.

The Use of Diamond Tools for Turning and Shaping of Small Parts—L. A. Hurwitz and R. A. Kurtz, Hamilton Watch Co.

Application of Diamond Tools to Turning, Boring and Reaming—Joseph Klipper, Vice President & General Manager, Clipper Diamond Tool Co.

Wed., March 21—9:30 a.m.

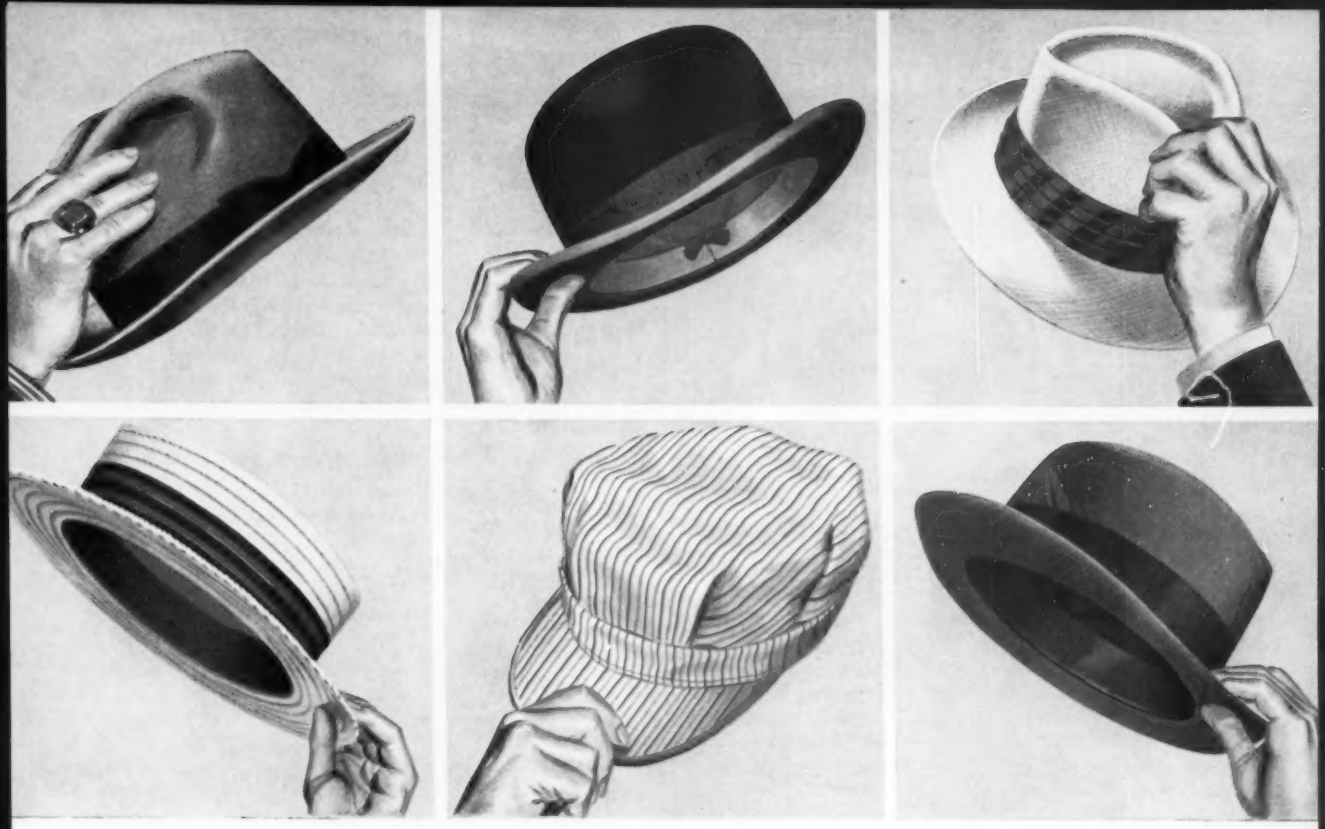
An Objective Look at the Field of Instrument Gearing—Louis D. Martin, Gear Consultant, Eastman Kodak Co.

Gears Gaging Automation — T. S. Gates, Chief Engineer, National Broach & Machine Co.

Wed., March 21—10:30 a.m.

Introducing Computers for Machine Tool Control—J. J. Stone, Asst. Chief, Electrical Engineering Div., Battelle Memorial Institute.

The Machinability Computer—Dr. W. W. Gilbert, Consultant Machinability Development Service, General Electric Co., and E. J. Weller, Carboloy Dept., General Electric Co.



Why hats are off to CIMCOOL...

. . . because CIMCOOL® has become, in just a few years, the largest selling cutting fluid in the world. And sales of this radically new and different coolant are continuing to climb because CIMCOOL Standard Concentrate has two big advantages over old-fashioned cutting fluids:

- **CIMCOOL LOWERS COSTS** because it's longer lasting in machines. Thus, it reduces downtime and cuts labor costs for cleaning and changing.
- **CIMCOOL DOES A BETTER JOB** because of its chemical lubricity. It permits faster speeds and increases tool life, for it combines friction reduction and cooling capacity in a degree never before attained.

We'll be happy to supply information on the many specific advantages of CIMCOOL Standard Concentrate—or details on the entire family of CIMCOOL Cutting Fluids. Just contact us and we'll have one of our Cincinnati Milling-trained machinists call on you —without cost or obligation. Wire, write, or telephone Sales Manager, Cincinnati Milling Products Division, The Cincinnati Milling Machine Co., Cincinnati 9, Ohio.

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CIMCOOL CUTTING FLUIDS

CIMCOOL **Concentrate**—The famous pink fluid which still covers 85% of all metal cutting jobs. Effective, economical and clean.

CIMCOOL **Tapping Compound**—Permits the use of highest tapping speeds and increases tap life amazingly.

CIMPLUS The transparent grinding fluid with exceptional rust control. Also used for machining cast iron and as a water conditioner with CIMCOOL Concentrate.

CIMCUT **Base Additive** — For jobs requiring an oil-base cutting fluid. Added to mineral oils, it gives an economical mix for higher speeds and feeds.

CIMCOOL **Bactericide** — The most effective agent yet developed to overcome rancidity and foul odors.

CIMCOOL **Machine Cleaner** — The two-phase non-corrosive cleaner that removes grit, dirt, slime and oil.

CIMCOOL Cutting Fluids

for 100% of all metal cutting jobs

PRODUCTION-PROVED PRODUCTS OF THE CINCINNATI MILLING MACHINE CO.

How Did Wyman-Gordon Cut Out ALL Lost Production Time In Moving a Machine Shop?

←Here's the answer

The old-timers said it couldn't be done in less than five days — but Barry Leveling Mounts so speeded the reinstallation of lathes, millers, and grinders that the entire moving operation took only a two-day weekend. The vital test-preparation department was ready for work again on Monday morning. The machines set on Leveling Barry Mounts required no drilling of floors, no lagging, no shimming — they were just spotted according to plant layout, and quickly leveled. And because Barry Mounts isolate vibration, the machines do not walk, building-borne noise is reduced, and the accuracy of the precision machines in the Test-preparation Department is protected.

Ask Barry how YOU can cut machine-moving costs.

How Did Bullard Stop ALL Toolroom Rejects Due to Vibration?

With the Bullard Company's toolroom only 50 feet from a main-line railroad track, the vibration from passing trains often caused work spoilage or lost time as grinder operators waited for trains to pass. Moving the toolroom was out of the question. But the seven surface grinders were isolated from external vibration by a simple installation of Leveling Barry Mounts under each machine — at a cost of only $50 per machine. Rejects due to vibration were completely eliminated!

Ask Barry how YOU can protect precision machinery.

How Can YOU Gain These Advantages?

It's easy. Write for our plant survey booklet M-256 that tells you where to look for savings in your plant, then talk over your machine-mobility needs and vibration problems with a Barry representative or Barry Mount distributor.

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795 PLEASANT STREET, WATERTOWN 72, MASSACHUSETTS

PROGRAM

Wed., March 21—1:30 p.m.

Cemented Particle Diamond Tools—C. Law McCabe, Metals Research Lab., Carnegie Institute of Technology.

The Selection of Diamonds for Various Applications—Dr. G. P. Freeman, D. Drukker and Zn. N. V.

Cutting of Glass, Ferrites, Carbide and Ceramics — Leon Van Geers-Daele, Diamant Bort.

Wed., March 21—2:30 p.m.

Impact of High Accuracy (Low Tolerance) Requirements on Jigs and Fixtures in Mass Production—A. V. Bodine, President, The Bodine Corp.

Automation—Its Effect on Jigs and Fixtures—H. M. Adams, Automation Specialist, Chrysler Corp.

Wed., March 21—3:30 p.m.

A Survey of Surface Finish Inspection Techniques—C. H. Good, Production Engineer, Micrometrical Manufacturing Co.

Surface Finish and the Production Engineer—Dr. C. R. Lewis and A. L. Thomson, Chrysler Corp.

Wed., March 21—8:00 p.m.

Automation for the Big Production Shop — Ralph E. Cross, Executive Vice President, The Cross Co.

Automated Electronics — J. B. Cunningham, Manufacturing Specialist, Convair Division — General Dynamics Corp.

Thursday, March 22—9:30 a.m.

Chairman: NPFA representative.

(The National Fluid Power Association will cosponsor a conference on fluid power for the tool engineer.)

Thursday, March 22—10:30 a.m.

Crater Wear of Cutting Tools—Prof. K. J. Trigger and Prof. B. T. Chao, Dept. of Mechanical Engineering, University of Illinois.

Some Applications of Research Findings to Shop Problems—Prof. L. V. Colwell, Dept. of Production Engrg., University of Michigan.

Thursday, March 22—1:30 p.m.

The Training and Development of Tool Engineers—Prof. O. W. Boston, Dept. of Production Engineering, University of Michigan.

There's **MORE** rating selection available in Allis-Chalmers **MOTORS**

To meet industry needs...

Allis-Chalmers Offers Complete Line of Rib-Type MOTORS from 1 to 100 Hp

Allis-Chalmers, a pioneer in rib-type TEFC motor design, is the only leading manufacturer offering a complete line of these motors from 1 to 100 hp. The many cost-saving features of deep-rib construction can be applied in a variety of uses... both indoors and out.

Here's why these motors can cut your costs:

MORE cooling surface — Rib-type design provides reserve cooling capacity in dirty locations.

MORE iron—Cast-iron frame and external parts assure rigidity and resistance to corrosion.

MORE copper — Allis-Chalmers greater use of copper increases electrical life.

MORE lubrication provisions — Large grease reservoirs surround bearings. Provision made for in-service relubrication — important where moisture or corrosive vapors contaminate grease.

As a new machinery component or as replacement, specify Allis-Chalmers. To find out more, contact your nearby Allis-Chalmers distributor, district office, or write Allis-Chalmers, General Products Division, Milwaukee 1, Wisconsin.

A-4936

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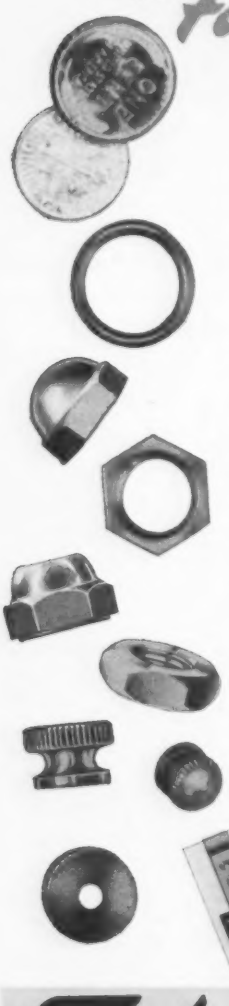
BRASS AND ALUMINUM NUTS



Costing no more than nuts produced by other, less accurate methods, Fischer precision-turned brass and aluminum nuts make possible important savings in assembly operations. Check these advantages:

Countersunk on both sides for faster starting . . .

Tapped square with face to Class 2 tolerances for smoother, easier running and superior bearing surfaces . . .

Turned from stock under basic size so they're never tight on wrenches . . .

Tapped through, eliminating "blanks" or rejects . . .

Cleaned and degreased before delivery to save you these operations.

Specify Fischer on your next order. A complete range of standard types and sizes is maintained in stock . . . "specials" can be produced quickly and inexpensively.

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TURNED NUTS Fischer SPECIAL MFG. CO. CINCINNATI OHIO SINCE 1905

C-284-FS

PROGRAM

Industry Looks at the Engineering Shortage — T. C. Gleason, Asst. Chief Engineer, Chrysler Corporation Laboratories.

Thursday, March 22—3:30 p.m.

Product Changes Improves Manufacturability — L. D. Miles, General Electric Co.

Control of Tool Costs Lowers Production Costs—E. Griffiths, Director of Expense Control, Headquarters Mfg. Division, Westinghouse Electric Corp.

Friday, March 23—9:30 a.m.

Measuring Productivity in Tool Design—Prof. A. F. Gould, Dept. of Industrial Engrg., Lehigh University.

Planning for Tomorrow's Gaging—by Lewis O. Heinold, Manager, Automatic Control Engineering Dept., Federal Products Corp.

Friday, March 23—10:30 a.m.

ASTE-Recommended Carbide Tool Tip Standards—W. H. Seacord, Supervisor of Mfg. Standards Research, International Harvester Co.—Mfg. Research Dept.

The Need for Tool Steel Standards—Dr. G. A. Roberts, Vice President—Technology, Vanadium Alloys Steel Co.

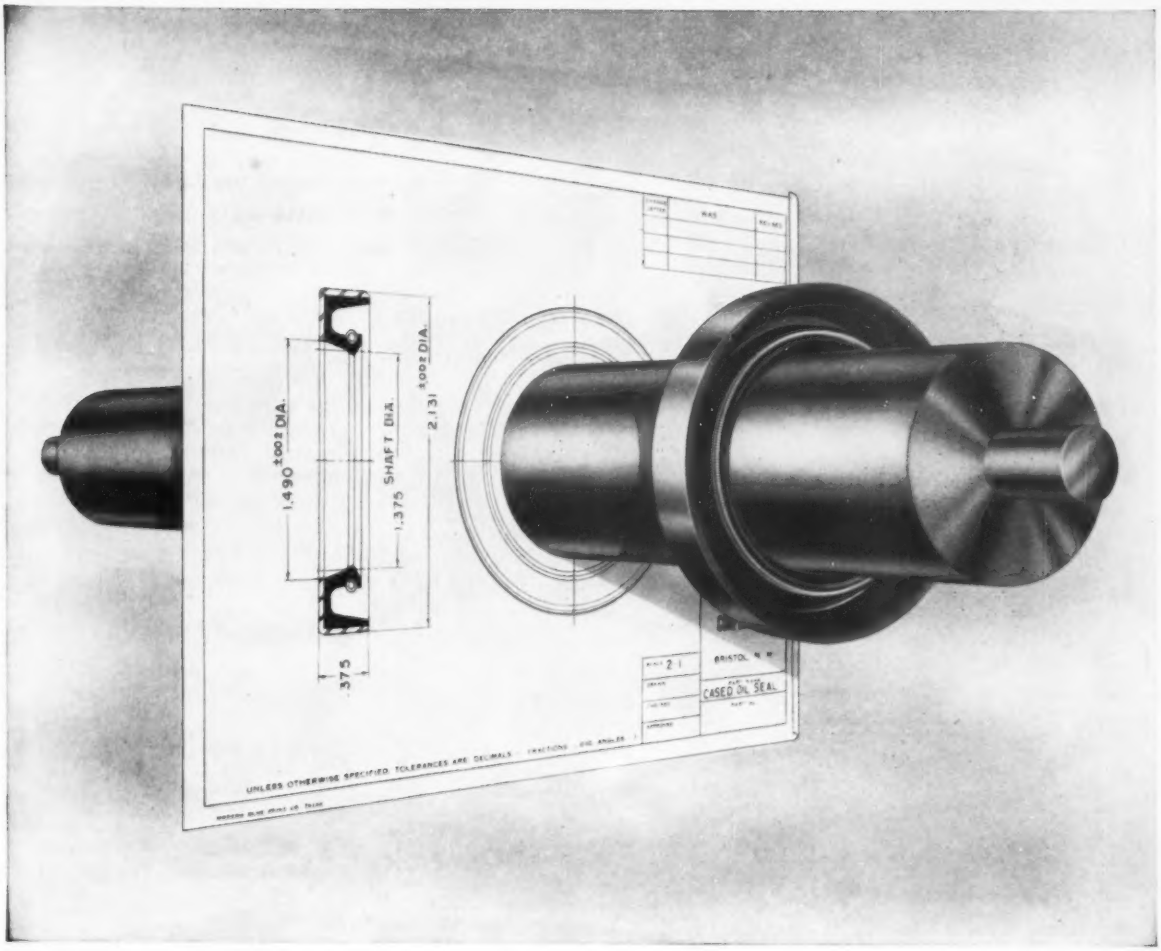
Friday, March 23—1:30 p.m.

Tooling Problems for Utilization of Large Hydraulic Presses — A. E. Favre, Chief Prod. Engr., Cleveland Forge Plant, Aluminum Company of America.

Tool Problems Peculiar to the Heavy Press Extrusion Industry — H. J. Ross, Production Mgr., Heavy Press Extrusion Plant, Kaiser Aluminum & Chemical Corp.

Friday, March 23—2:30 p.m.

Soluble Oils and the Tool Engineer—Dr. R. K. Gould and R. C. Givens, Technical Service Division, Research & Technical Department, The Texas Co. **Role of Cutting Fluids in Machinery Operations**—will be presented by Dr. M. E. Merchant, Asst. Director Research, Cincinnati Milling Machine Co.



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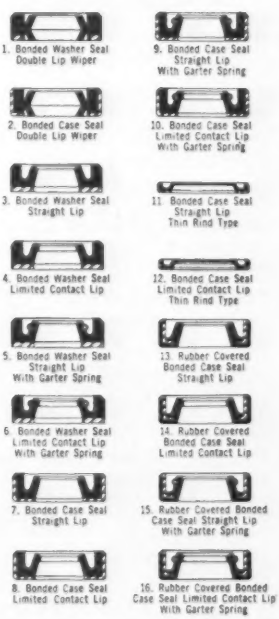
1. Bonded Washer Seal Double Lip Wiper
9. Bonded Case Seal Straight Lip With Garter Spring
2. Bonded Case Seal Double Lip Wiper
10. Bonded Case Seal Limited Contact Lip With Garter Spring
3. Bonded Washer Seal Straight Lip
11. Bonded Case Seal Straight Lip Thin Rind Type
4. Bonded Washer Seal Limited Contact Lip
12. Bonded Case Seal Limited Contact Lip Thin Rind Type
5. Bonded Washer Seal Straight Lip With Garter Spring
13. Rubber Covered Bonded Case Seal Straight Lip
6. Bonded Washer Seal Limited Contact Lip With Garter Spring
14. Rubber Covered Bonded Case Seal Limited Contact Lip
7. Bonded Case Seal Straight Lip
15. Rubber Covered Bonded Case Seal Straight Lip With Garter Spring
8. Bonded Case Seal Limited Contact Lip
16. Rubber Covered Bonded Case Seal Limited Contact Lip With Garter Spring

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P2

AIRCO

WELDING and BRAZING *Hints*

PROBLEM:

To weld and braze aluminum

SOLUTION:

Airco #718 Aluminum Brazing Rod. This free flowing rod (at 1050°F.) maintains low flow temperature and assures good penetration of aluminum brazing alloy at the joint. Recommended for brazing aluminum assemblies having base metals of 52S, 61S, 63S and other compositions.

Airco #25 Drawn Aluminum Rod. Composed of commercially pure aluminum composition known as 2S. Recommended for welding base metals of 2S and 3S analysis.

Airco #26 Drawn Silicon-Aluminum Rod. This rod is generally recommended for repair jobs when there is doubt as to the analysis of the aluminum parts to be welded.

Napolitan Sheet Aluminum Welding Flux. Formula 40 is unsurpassed for welding aluminum and its alloys in either sheet or cast form. *Formula 42* generally is satisfactory to use for a variety of work where reduction of welding costs is a factor. It is less expensive than formula 40.

Airco Aluminum Brazing Fluxes. Formula 44 is designed, primarily, for furnace brazing of brazable alloys. *Formula 60* is primarily for torch brazing of aluminum.

Send for this free catalog!
You'll find here the finest rods and fluxes for joining both ferrous and non-ferrous metals. Write Airco at address below.

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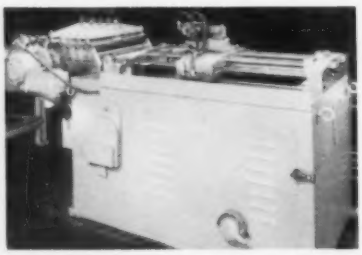
Tool Show Preview

Over 500 firms will display the latest in improved equipment, tools and methods at the 24th ASTE Show . . . Here's a preview look at many of the products to be shown.

Feeds in any direction

A cabinet-mounted, motor-driven slide unit for feeding coil stock into punch presses or press brakes can be used for feeding in any direction.

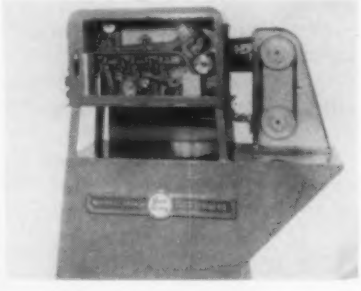


The machine is individually motor-driven and there is no mechanical connection to the press. *U. S. Tool Co., Inc.*

For more data circle No. 52 on postcard, p. 189

Gear gager and sorter

A gear gager and sorter will be displayed at the show checking and sorting small automotive pinions automatically for tooth size accuracy. The machine will have a transparent plastic cover and mirror arrangement to show how the gage checks parts to tenths of a thousandth accuracy, sorts them according to specifications and shuts down gear production machine if more than a given number of rejects of specific type are successively produced. *National Broach & Machine Co.*



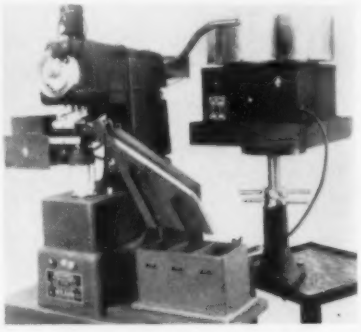
For more data circle No. 53 on postcard, p. 189

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 189. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

Automatic hardness tester

By the use of tiny photo transistors and intricate timing mechanisms, a new Rockwell tester is reportedly capable of testing the hardness of both ferrous and nonferrous metals, in hard or soft condition at the rate of up to 1000 pieces per hr. The circuit can be set to control the hardness limits as close as two Rockwell points. *Wilson Mechanical Instrument Div., American Chain & Cable Co., Inc.*



For more data circle No. 54 on postcard, p. 189

Specialty steels

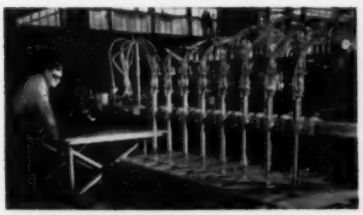
Highlights of one firm's display are first showing of an improved die steel developed especially for cold heading and first exhibition of a manganese oil-hardening die steel. The die steel for cold heading is an improved deep-harden-

ing, water-quenching alloy known as H-9 double header die steel. It is being recommended for dies larger than 1½ in. in diam and for inserts, insert holders, coining dies, and knurls. *Carpenter Steel Co.*

For more data circle No. 55 on postcard, p. 189

Steel plate

A demonstration of mechanized flame cutting of plain and irregular shapes from steel plate, employing an electronic eye tracer, plus a machining operation performed on shapes flame-cut from a new, easily cut steel plate, will be featured by one firm. The E-Z-Cut steel plate is the company's newest



leaded steel, recommended for making die bases, jigs, molds, and other products in which considerable machining is involved. The machining operation is designed to show the good machinability of the E-Z-Cut plate. *Joseph T. Ryerson & Son, Inc.*

For more data circle No. 56 on postcard, p. 189

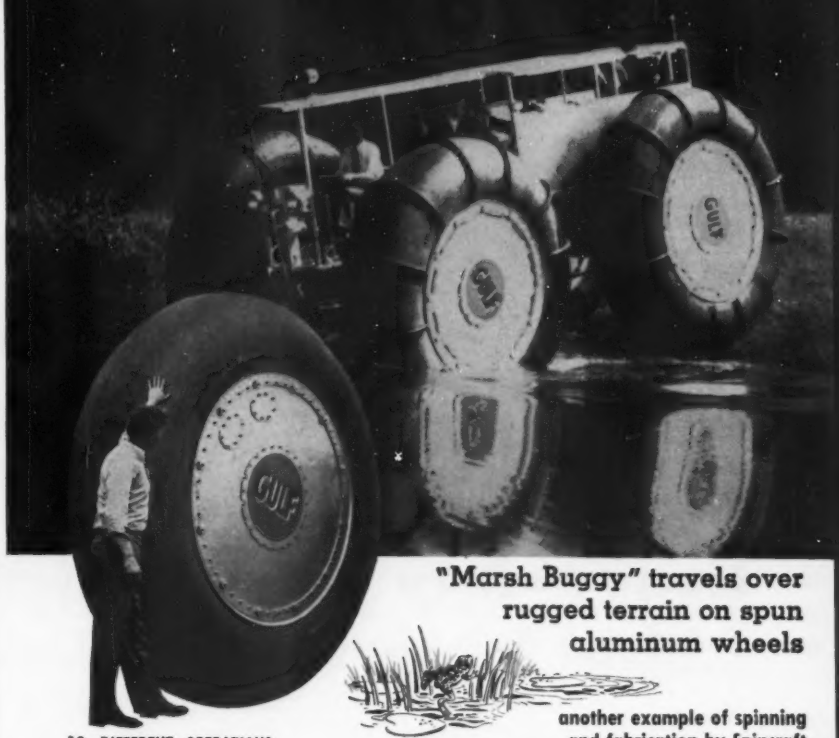
Metal cleaner

An alkaline compound that removes rust, oxide scale, paint and shop soils without changing dimensions of precision parts or causing hydrogen embrittlement is featured by one manufacturer. The firm stated that the compound may be used in hot or cold water solutions, with or without current and with or without cyanide. It is described as not attacking sound metal; having an action that stops as soon as rust has been removed; providing temporary protection against rerusting; not requiring special equipment; not creating troublesome fumes; and not requiring extra precaution in its disposal. *Oakite Products, Inc.*

For more data circle No. 57 on postcard, p. 189

Spincraft did it for Gulf Oil...

Spincraft can do it for you!



"Marsh Buggy" travels over rugged terrain on spun aluminum wheels

another example of spinning and fabrication by Spincraft

13 DIFFERENT OPERATIONS

The "Marsh Buggy" rolls on sturdy, lightweight aluminum wheels — spun and fabricated by Spincraft. Even if all four balloon tires fail, the spun aluminum air-tight wheel drums will keep the vehicle afloat. Wheel flange segments, extensions, .118" thick 52SO aluminum stiffener ribs, No. 11 U. S. gauge (.125" thick) stainless steel front hub cones were machined and assembled to complete the wheels. In addition to spinning, Spincraft performed the following operations: welding, grinding, polishing, machining, punching, braking, drilling, tapping, sawing, riveting, assembly and testing.

Write for Spincraft data book. If you have a specific problem, tell us about it — no obligation.

WHEN Gulf Research & Development Co., a division of Gulf Oil Corp., contracted to build their world-famous "Marsh Buggy" for the U. S. Army, Gulf called on Spincraft to fabricate all four wheel assemblies.

These huge wheels are designed to bear loads of 1,500 to 4,000 lbs. Combining strength with lightweight, these tough aluminum alloy wheels can take grueling cross-country punishment. The 10-ft. dia. tires easily negotiate swamp, water, sand, deep mire and other difficult terrain, at speeds from ¼ to 40 miles per hour.

This is another example of Spincraft's versatility and manufacturing skill. Complete facilities are available for all types of contract manufacture — finished parts, assemblies and complete products. Take advantage of our modern tools for spinning and fabricating. They can pay off in savings for you, too.

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World's largest plant fully equipped for all types of metal spinning • deep drawing • stamping • fabricating

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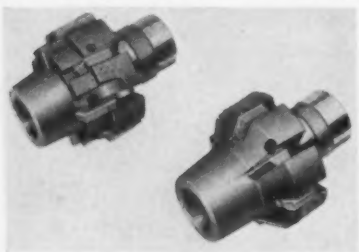
Multiple-cutting tools

Special multiple-cutting tools are described as eliminating six separate operations formerly required. Following initial operations with standard cutters on, in one case, engine cylinder heads, two special multiple-cutting tools are used to machine the intake valve seat. The first tool roughs out the valve seat by boring, facing and chamfering

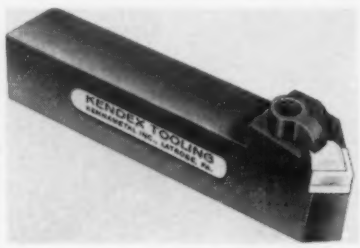


in one pass. The second multiple-cutter finishes the valve seat and forms clearance. Multiple cuts at one pass of the tool are also performed at two other locations in the cylinder head, the air start check valve hole and the spray valve hole. Machining of these latter openings includes rough, semi-finish, finish and chamfer operations. *Ex-Cell-O Corp.*

For more data circle No. 58 on postcard, p. 189

New carbide tooling

Carbide tools in a variety of new sizes are now available, including those for turret lathes, planers, automatic cycling machines and milling cutters. A standard kit con-



taining eight assortments of tool holders and carbide inserts is to be shown, which provides service for the entire line of negative rake tool styles and sizes. *Kennametal, Inc.*

For more data circle No. 59 on postcard, p. 189

Checking equipment

A line of equipment including dial gages, holding posts, magnet chucks, micrometer, caliper gage, vernier caliper and double-end end mills, includes small size bench

center (illustrated) which is designed for use where the work does not exceed 18 in. in length, is featured in one exhibit. This equipment to be shown is in addition to the firm's line of precision tools, milling cutters and arbors, electronic measuring equipment, screw machine tools, permanent magnet chucks and pumps which will also be displayed. *Brown & Sharpe Mfg. Co.*

For more data circle No. 60 on postcard, p. 189

Heavy-duty 1-story existing buildings ideal for metal-working industries

Available at LOW COST in the 2,300,000 sq. ft. Eddystone, Pa. INDUSTRIAL CENTER

America's largest one-story buildings available today:

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Keeping customers, large and small . . . getting new customers and serving them—these sum up a substantial part of Alan Wood's success story. Alan Wood Steel does it through product dependability, service, competitive spirit and pioneering courage. As customer and industry needs change, Alan Wood keeps pace—or sets pace, as in the development of new or improved products. Behind it all is a guiding policy of planned growth that has helped Alan Wood Steel expand from a tiny shop in 1825 to a versatile, fully integrated steel mill that still provides individualized service and attention to its customers.

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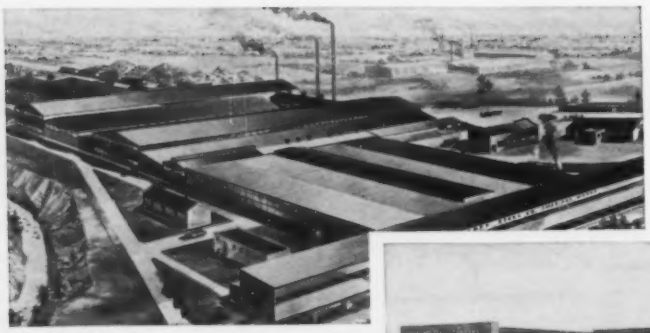

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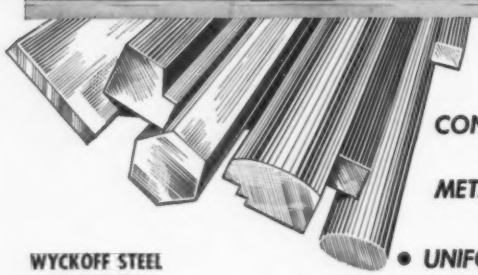

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- INCREASED MACHINE SPEEDS
- LONGER TOOL LIFE

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Works: Ambridge, Pa.—Chicago, Ill., Newark, N.J.—Putnam, Conn.

Grinding attachment

An attachment for an electrical discharge machine is a horizontal-vertical grinding unit which chucks right into the spindle of the standard machine tool. The fixture allows an operator to grind in a horizontal plane using a brass wheel which is driven by a motor

mounted at the base of the machine and using a flexible shaft. With flexible drive it allows freedom in the indexing of the unit from one plane to another with no interference. *Elox Corp. of Michigan.*

For more data circle No. 61 on postcard, p. 189

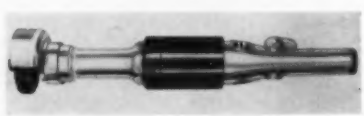
Vacuum melted tool steels

Tool steel specimens produced commercially by consumable electrode vacuum melting will be exhibited at the ASTE show. Tests indicate the material is cleaner, more homogenous, has less inclusions and is more gas free, making it suitable for high grade tool steels where metal purity is highly desirable. *Allegheny-Ludlum Steel Corp.*

For more data circle No. 62 on postcard, p. 189

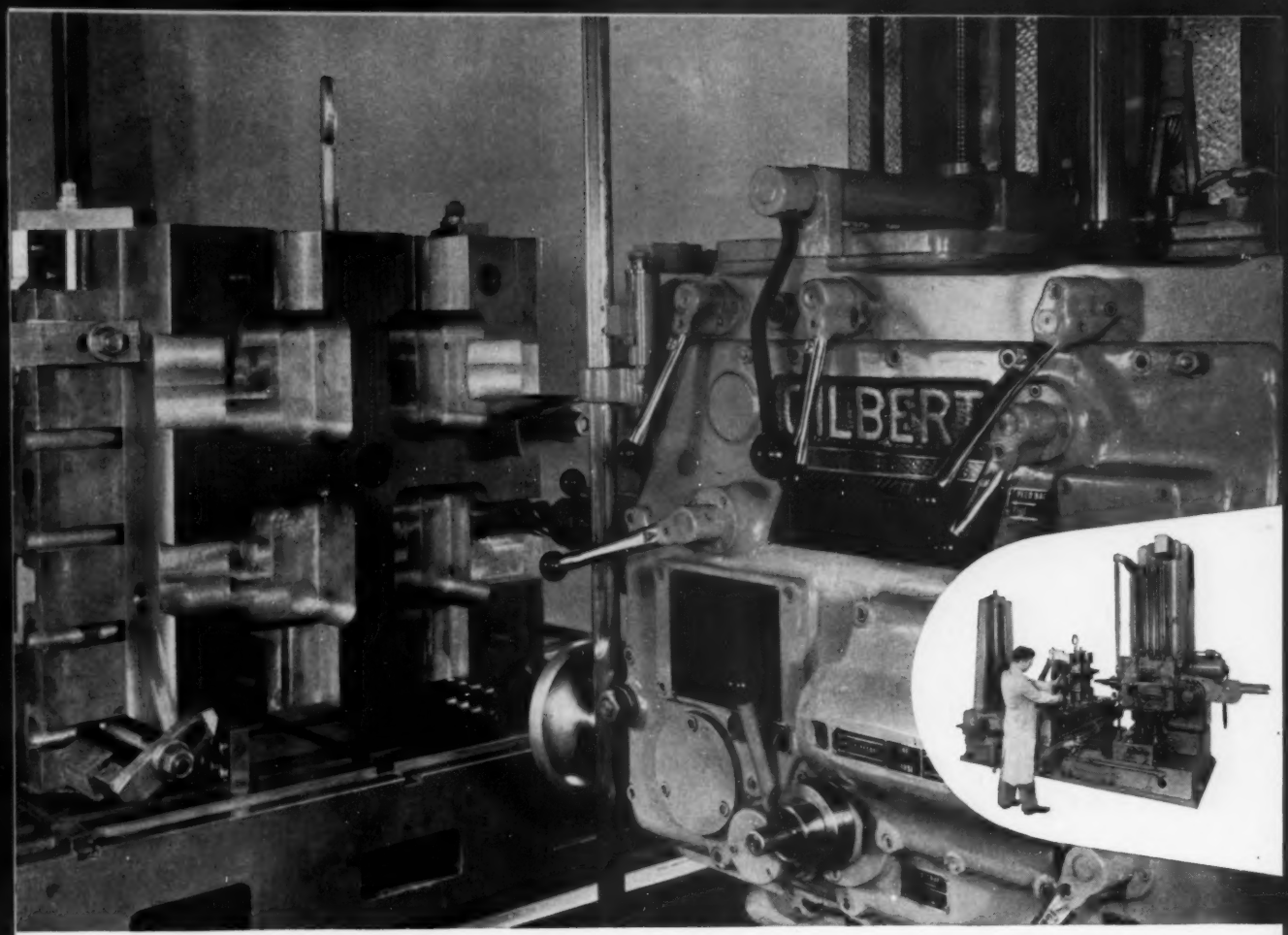
Pneumatic abrasive tools

Highly sensitive governor enables this new line of air-powered abrasive tools to develop greater power and maintain higher speeds under



load. More metal is removed in less time, it is claimed. Machines are no larger than previous models, despite increased power and speed. *Buckeye Tools Corp.*

For more data circle No. 63 on postcard, p. 189



courtesy Mohawk Tool & Die Corporation and Macauley Machinery Co.

30 percent savings and ±.001"

...match it with a Gilbert

How's this for a perfect lineup: 30% savings in floor-to-floor time over previous machines, and ±.001" for mating the two chases of a four-cavity carburetor bowl mold.

Mohawk Tool & Die Corp., Rochester, N.Y., gets these savings and accuracy by handling the job on a Cincinnati Gilbert horizontal boring mill.

Here the lower chase (of hot work die steel) is being rough machined. Then it's hardened to a Rockwell of 48-50C scale. Finally, the chase is finish machined with carbide to an accuracy of ±.001" for guide pin and bushing holes, four cavity pockets, and eight slide ways.

Says Mr. George Neward, Mohawk's Secretary-Treasurer: "This job illustrates the flexibility of this type of machine. The ruggedness and stability of the Cincinnati Gilbert has been proven to us without doubt."

The comparatively low cost of adding these advantages to your operations will surprise you. Write for new literature, or—better yet—get a proposal from Gilbert now.

The Cincinnati Gilbert Machine Tool Co.,
3366 Beekman Street, Cincinnati 23, Ohio

You can buy a new compound table type Gilbert horizontal boring mill on a 5-year payment plan for as little as $5580 down and $428.36 a month. This is $1.28 an hour on a two 8-hour-shift operation. Includes low 6% simple interest (3% add on).

those who buy Gilbert buy **GILBERT** *again*

How IH uses automatic finishing equipment

Binks installation at International Harvester

"...paid for itself 1½ times in first year of operation."

Improving product quality by improving production methods is typical of the International Harvester Company. About one year ago International sought an economical way to speed up the coating of radiator cores for its well known tractors and trucks...and to reduce the number of rejects.

K. J. Merner, Paint Engineer at International's Melrose Park, Ill., Works, called in Binks engineers to help him and his associates solve the problem. The result is a custom-designed Binks Flo-Coat machine which, says Mr. Merner, "paid for itself 1½ times in the first year of operation."

This unusual economy is obtained by:

(1) *The finishing of radiator cores at unprecedented speeds.*

(2) *Complete, uniform coating of even hard-to-get-at areas.*

(3) *Reduction of material waste to the minimum.*

(4) *Almost total elimination of rejected radiator cores.*

For every industry

Almost any mass-produced product manufactured today can be finished or coated...better, faster and more economically...with Binks automatic finishing equipment.

FREE ENGINEERING HELP

Binks engineers work closely with manufacturers in the design and installation of automatic equipment that meets special requirements. Binks' long experience in this field is available to you without obligation. Just contact your nearest Binks Branch Office, or write directly to the address below:

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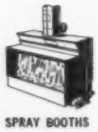
SPRAY BOOTHS

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Binks Manufacturing Company
3124-30 Carroll Ave., West, Chicago 12, Ill.

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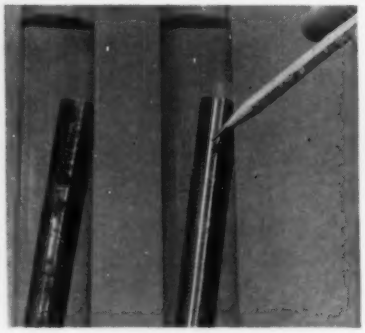
Cutting compound

A new product, called Dromus Oil E, has been perfected which is reported, when dissolved in water, to yield a safe and economical cutting solution for use in all types of machine tools. Advantages listed are: the working solution has exceptional cooling properties; it dissolves in water, forming a true solution; it may be mixed with large volume of water for latter's cooling effect; does not leave greasy deposits; and will not froth or foam or form hard-to-clean sludge. Photograph shows rust-free steel rod (right) after six months immersion as compared with rod in tap water two hours. *Shell Oil Co.*



For more data circle No. 64 on postcard, p. 189

New tool steels

Four new tool steel grades, included in one company's display, can be summarized briefly as follows: MC mold and cavity steel is a medium carbon-alloy die steel designed especially for molds and cavities where high surface finishes are desired. Chromewear steel is designed to meet the needs of the refractory and ceramics industry where abrasion resistance is of prime importance. WCC hotwork die steel was created to meet the needs for hot work applications with strong resistance to wear and thermal fatigue. Hotform V steel is a 1 pct Vanadium modification of Hotform No. 2, a steel recommended for use in aluminum dies and cores. *Vanadium-Alloys Steel Co.*

For more data circle No. 65 on postcard, p. 189

See why Tool Engineers call these heavy producers,

"MOST MODERN MACHINES OF THEIR TYPE"

Hydraulic pre-selection of speeds set by handwheel and read on illuminated dial. 16 spindle speeds—ratio 1:50—up to 310 rpm for carbide machining on Model KE 100. Table runs on tapered roller bearings.

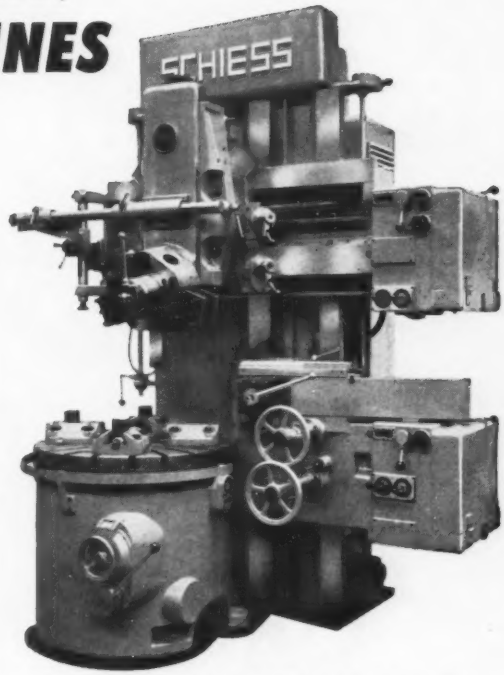
Fingertip control for direction of feed and rapid traverse with spring-loaded mono-levers for normal direction plus angular compound feeds. Mono-levers move in same direction as desired feed or traverse movement, simplify correct setting by operator. Specially designed electro-magnetic disc clutches disengage feed instantly with no over-riding or coasting.

Counterbalanced cross rail and side head. Single lever unlocks, raises or lowers, and locks cross rail simultaneously by electro-mechanical controls. *No bolts or nuts to loosen or tighten by hand.*

Magnetic dry particle clutch provides vibration-free drive for smooth surface finish. Power is transmitted via belt to clutch from main motor mounted on left side of machine. Instantaneous braking is assured by magnetic dry disc brake.

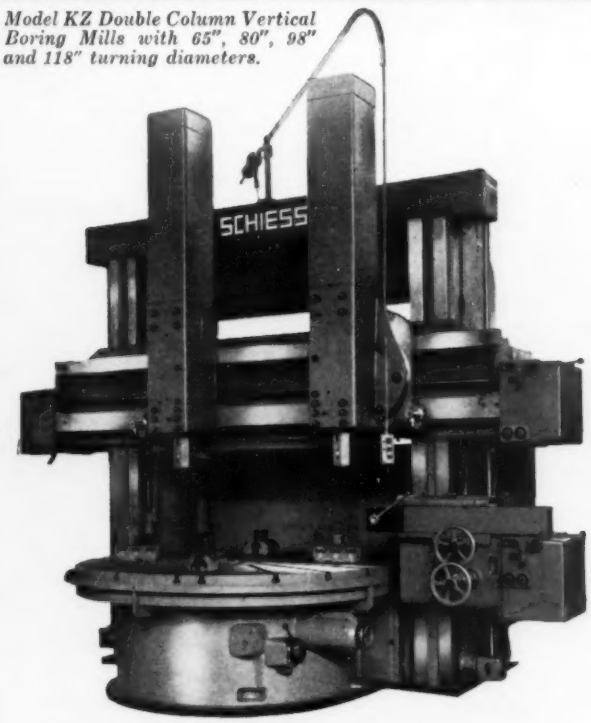
Copying attachment with electric tracer for use on cross rail or side head.

See it tracing tire molds at ASTE Show—Booth 305



Model KE Single Column Vertical Turret Lathes with 40", 50" and 65" turning diameters for high-speed carbide machining.

Model KZ Double Column Vertical Boring Mills with 65", 80", 98" and 118" turning diameters.



All operating features of KE Series Vertical Turret Lathes are combined in

SCHIESS KZ DOUBLE COLUMN VERTICAL BORING MILLS, PLUS—

Heads equipped with steel octagon rams can be swiveled—have automatic feed in vertical, horizontal and angular direction and are independent of one another as to amounts and direction of feed. Table operated by three-button pendant control. Standard model KZ Double Column Vertical Boring Mills are available with 65", 80", 98" and 118" turning diameters.

Get to know these products of Europe's largest builder of heavy machine tools. Parts and service are as close as Pittsburgh. An American Schiess engineer will be happy to help you size up these heavy producers for your heavy production needs. Write for catalogs and complete specifications on these and all Schiess KE machines.

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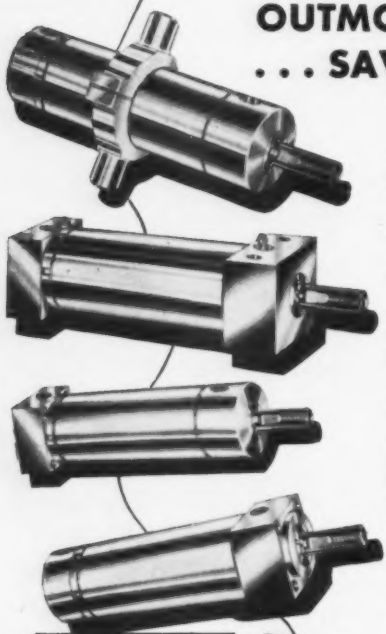
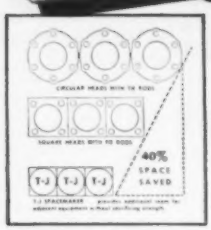


You'll never go back to tie-rod cylinders, once you apply T-J Spacemakers to your push-pull-lift jobs! Advantages in space saved, weight saved, greater strength and off-the-shelf delivery are among the dozens of Extras you get as Standard!

Now—these sensationally popular T-J Spacemaker Cylinders are available off the shelf *in sizes up to 8".* This means as many as 64,000 different combinations of styles, bores, strokes, mountings, etc., *immediately available!* Oil pressure to 750—Air to 200 P.S.I. Super Cushion Flexible Seals for Air ... New Self-Aligning Master Oil Cushion. Hard chrome plated bodies and piston rods (Standard). Only from T-J can you get these new ingenious cushion designs! Send for bulletin SM-155-2. The Tomkins-Johnson Co., Jackson, Michigan.



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T-J TOMKINS-JOHNSON

RIVETORS · AIR AND HYDRAULIC CYLINDERS · CUTTERS · CLINCHORS

Balancing machine

New concept in vibration analysis is claimed for the 36 lb Vibrodyne, designed for in-place balancing of parts rotating between 250 and 3600 rpm. Electronically operated, it balances by automatic indication of the amount and angular location of unbalance. *Tinius Olsen Testing Machine Co.*

For more data circle No. 66 on postcard, p. 189

New high speed steels

Improved high speed steels made possible by a new processing technique will be displayed at the ASTE show. High speed tools of the material are more predictable in performance, it is claimed. They have more uniform response to heat treatment, size change and service life. *Crucible Steel Co. of America.*

For more data circle No. 67 on postcard, p. 189

Rotary swagging machines

A new line of rotary swagging machines styled for the requirements of modern industry and designed for better operating efficiency are being shown. The units are described as offering greater capacity in each general size range. Bench models (like the one shown) can be furnished with a base which contains storage space for spare parts and dies. *The Torrington Co.*

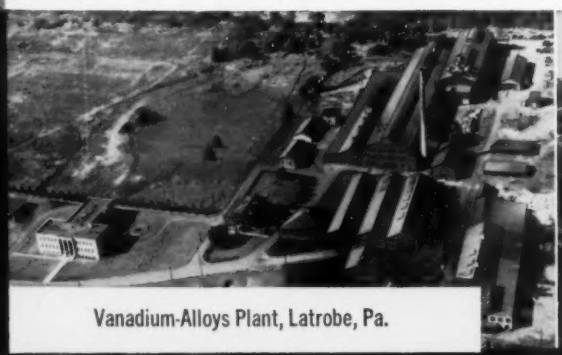
For more data circle No. 68 on postcard, p. 189

Vanadium-Alloys Steel Company

world's largest exclusive manufacturer of Tool Steels

—the capacity, the facilities, the skill and the will to serve you better!

Five manufacturing plants in the U.S. and Canada, twelve branch offices, well-stocked warehouses, a network of distributors in the major metal-working areas and individualized truck delivery provide the measure of our service ability. The First Quality of our tool steels is assured by complete specialization in manufacture and an unremitting concentration upon perfection, every working day in the year.



Vanadium-Alloys Plant, Latrobe, Pa.

Colonial Steel Plant, Monaca, Pa.

Anchor Drawn Steel Plant, Latrobe, Pa.

Hot Rolled Products from mills up to 22″ diameter—Cold Drawn Products—Precision Ground Products—Plate—Sheet Circles—Forgings. Standard and Special Shapes in High Speed, Die Steel and Special Tool Steel Compositions.

Pittsburgh Tool Steel Wire Plant, Monaca, Pa.

Vanadium-Alloys Steel Canada Limited, London, Ont.

Vanadium-Alloys Steel Company

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QUALITY

Pioneered in 1948, and backed by over 60 years' experience in the manufacture of abrasives, Tru-Steel Shot was the original High-Carbon Fully Heat-Treated Steel Shot of Tool Steel Quality!

Tru-Steel, and only Tru-Steel, has the head start in experience, in manufacturing know-how, in years of solving steel shot blasting problems!

Every heat of Tru-Steel is laboratory tested and controlled to the exacting standards of fine steel making!

Only in Tru-Steel are found the combined characteristics that have been sought for years in metal abrasives — super toughness for resistance to breakage and proper hardness for fast, thorough surface-bright cleaning.

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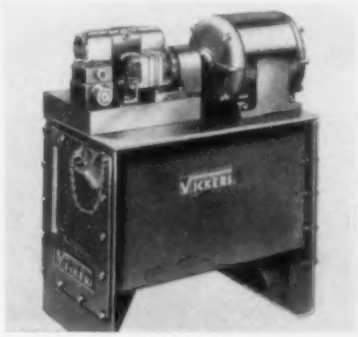
Butler, Pa.
Subsidiary of Pittsburgh Crushed Steel Co.
Pittsburgh 1, Pa.

Sold and recommended by
Pangborn Corporation, Hagerstown, Md.

Power unit

A hydraulic pipeless power package is designed to provide power and control to a wide variety of industrial machinery applications requiring low hydraulic horsepower.



The unit, consisting basically of an electric motor, hydraulic pump, control circuit and reservoir, is available in three circuits, three pump sizes and three electric motor sizes. *Vickers, Inc.*

For more data circle No. 69 on postcard, p. 189

Precision fasteners

High torque set screws, high strength wrenches for accurate tightening of socket head screws and titanium aircraft fasteners are being displayed at the show by one steel manufacturer. Other products of the firm to be shown include micro screws and micro self locking nuts, cap and set screws, hydraulic pressure plugs, dowel pins, spring pins and shaft collars. *Standard Pressed Steel Co.*

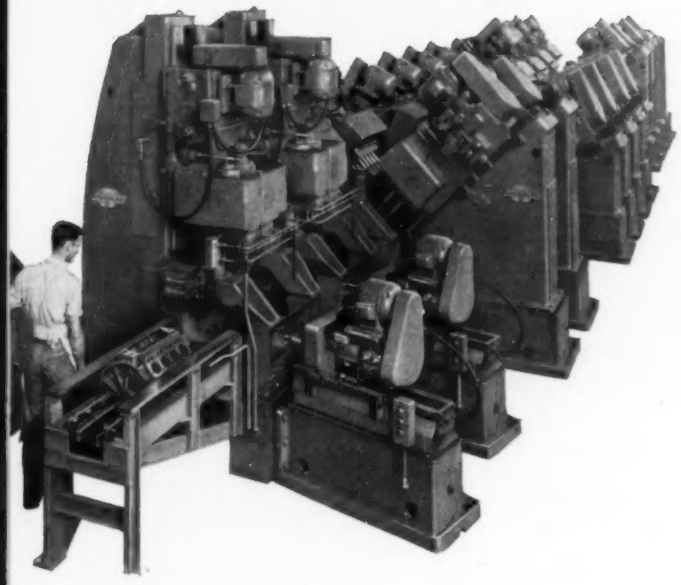
For more data circle No. 70 on postcard, p. 189

One ton multipress

Designed to fit automated lines working in conjunction with various types of feed mechanisms, a new 1 ton multipress is recommended for operations such as assembling, riveting, punching, marking, timing, pelleting, compacting, testing, straightening, broaching, swagging and others. Ram pressure of the unit can be quickly set from 500 to 2000 lb. *Denison Engineering Co.*

For more data circle No. 71 on postcard, p. 189

NOW...BIGGER TO SERVE YOU BETTER



New, Enlarged Production Facilities Speed Delivery of Greenlee
TRANSFER MACHINES

Pictured is one of four Greenlee assembly floors. This newly constructed, block-long building covers almost two acres of ground . . . provides a well-lighted, roomy area for erecting and testing Greenlee Transfer Machines similar to the ones illustrated.

This 17-Station Greenlee Transfer Machine, the first in a line of three . . . carries 152 tools. It automatically drills, countersinks, cleans and gauges holes in V-8 cylinder blocks. Take advantage of Greenlee's specialized assistance in planning for automatic production. Write or wire today for a consultation.

PRODUCTION MACHINERY
GREENLEE

GREENLEE BROS. & CO.
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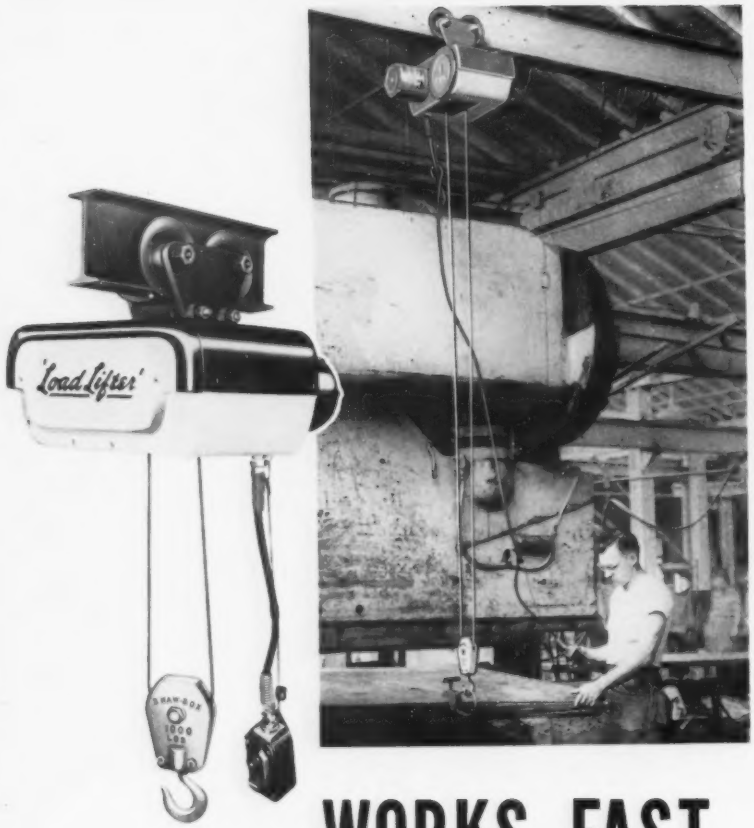
Rockford, Illinois



WORKS FAST

TO HOLD DOWN PRODUCTION COSTS

A fast, rugged hoist is a "must" wherever loads up to a ton are lifted often in production. The Series "600" 'Load Lifter' Electric Hoist fills the bill exactly! A ½-ton load can be lifted at 30 FPM speed. The hoist has *two* automatic brakes that work together. This feature, plus handy push-button control, assures the quick action needed to "spot" loads accurately. And, the flexible wire rope saves time on narrow-angle side lifts.

Get more lifts per hour into *your* load-handling operations. Do it with the cost-cutting Series "600" 'Load Lifter' Electric Hoist. It has safe 24 volts at the push button and every other practical safeguard for man, load and hoist. Capacities: ½ and 1 ton. All types of suspension available to give you the utmost in efficiency and economy. Ask your "Shaw-Box" Distributor for details or write us for Bulletin 408.

MAXWELL MANNING M&M MOORE & INC. TRADE MARK

'Load Lifter' ® ELECTRIC HOISTS

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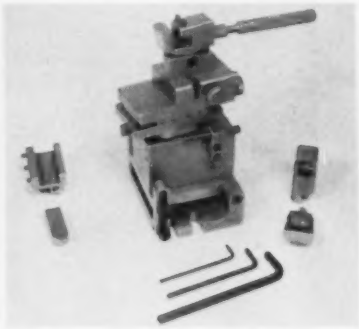
Builders of "SHAW-BOX" and 'LOAD LIFTER' Cranes, 'BUDGIT' and 'LOAD LIFTER' Hoists and other lifting specialties. Makers of 'ASHCROFT' Gauges, 'HANCOCK' Valves, 'CONSOLIDATED' Safety and Relief Valves, 'AMERICAN' and 'AMERICAN-MICROSEN' Industrial Instruments, and Aircraft Products.

Grinding fixture

A newly developed radius grinding fixture allows for redressing tools. Adapter heads for holding the shankless, round shank or square tool bits are interchangeable on

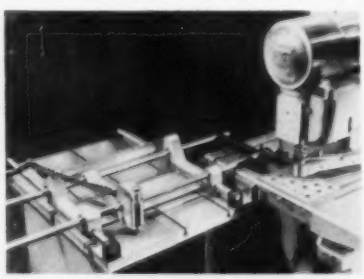


the fixture by removing one screw only. This fixture was developed to be used on any tool and cutter grinder that has infeed. *Apex Tool & Cutter Co.*

For more data circle No. 72 on postcard, p. 189

Positive duplicator

This machine is a pantograph-like mechanical device for locating holes in simple or complicated patterns, and actuating the punching



mechanisms, from a templet, by remote control, yet with extreme accuracy. It is designed for use with the manufacturer's fabricator. *Wales-Strippit Corp.*

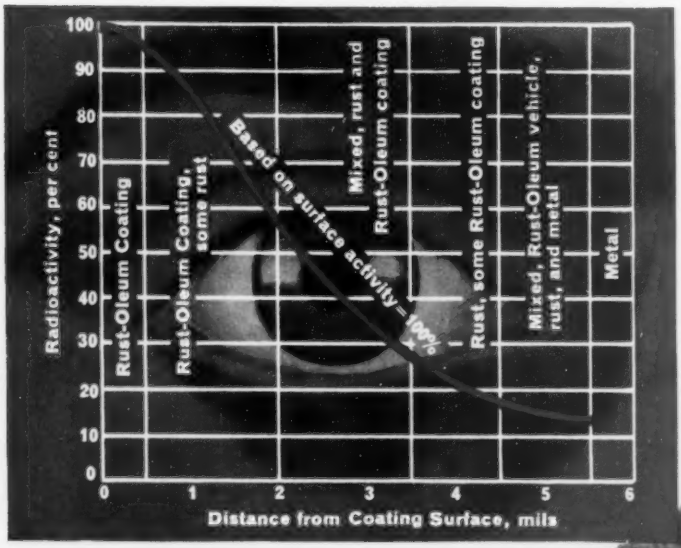
For more data circle No. 73 on postcard, p. 189

Solid cutters and end mills

A new line of solid cutters and end mills will be displayed at booth 633 of the ASTE show. The manufacturer now claims complete tool coverage in the milling field. Inserted type milling cutter, holders and single point tool bits also will be shown. *The O.K. Tool Co., Inc.*

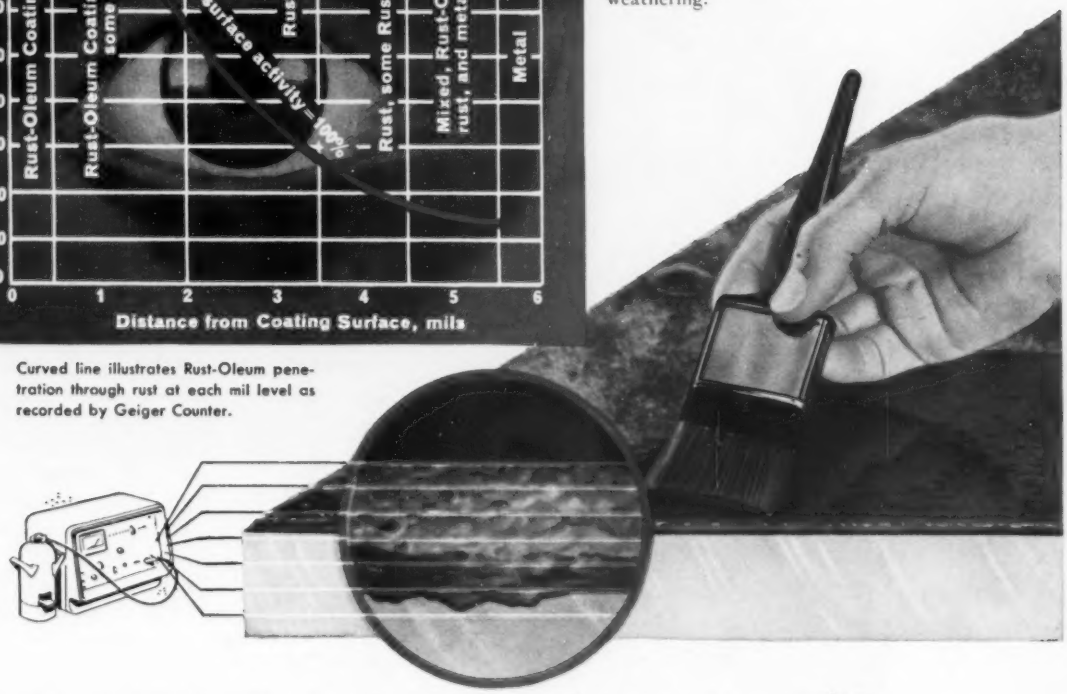
For more data circle No. 74 on postcard, p. 189

See Rust-Oleum *penetrate rust* to bare metal through the "Eyes" of Radioactivity!



Curved line illustrates Rust-Oleum penetration through rust at each mil level as recorded by Geiger Counter.

Rust-Oleum dries to a firm, decorative coating that resists salt water, sun, fumes, heat, humidity, and weathering.

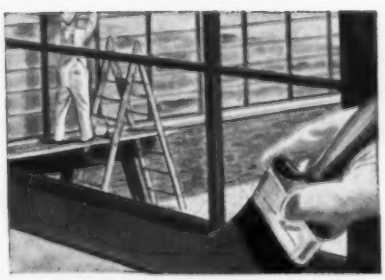


Geiger Counter traces Rust-Oleum penetration to bare metal! In nearly three years of radioactive research, Rust-Oleum's *specially-processed* fish oil vehicle was radio-activated and formulated into Rust-Oleum 769 Damp-Proof Red Primer – then applied to rusted test panels. Rust-Oleum's specially-processed fish oil vehicle was then traced through the rust to bare metal by Geiger Counter.

This penetration means rust-stopping power, because the fish oil vehicle works its way into the tiny pits in the metal where it drives out air and moisture that cause rust. Important savings are yours, because Rust-Oleum can be applied directly over sound rusted surfaces – usually eliminating costly surface preparations. Attach coupon to your business letterhead for your copy of the thirty-page report entitled, "The Development of a Method To Determine The Degree of Penetration of a Rust-Oleum Fish-Oil-Based Coating Into Rust On Steel Specimens," prepared by Battelle Memorial Institute technologists. Prompt delivery of Rust-Oleum is assured from your nearby industrial distributor.

There is only one Rust-Oleum. It is distinctive as your own fingerprint.

RUST-OLEUM®



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THE FAMOUS **STRAYER ELECTRIC** BUCKET
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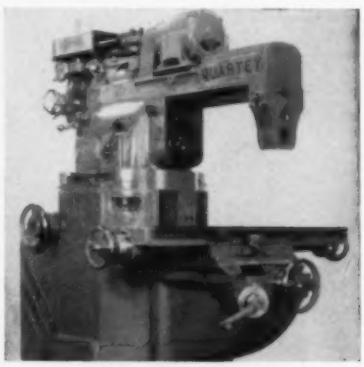
Induction hardener

Especially designed for rapidly hardening small parts, thin walled parts, workpieces requiring a shallow case and a narrow transition zone, a new induction hardening machine operates at frequencies of 1200 to 1400 kc. The unit is so designed that it can easily be equipped with an automatic work handling system and setup for completely automatic operation. The circuit is also designed to receive automatic control at a high speed. If desired, the work and oscillator units can be located directly in a production line and the power supply placed several hundred feet away in an area of low cost floor space. *Cincinnati Milling Machine Co.*

For more data circle No. 75 on postcard, p. 189

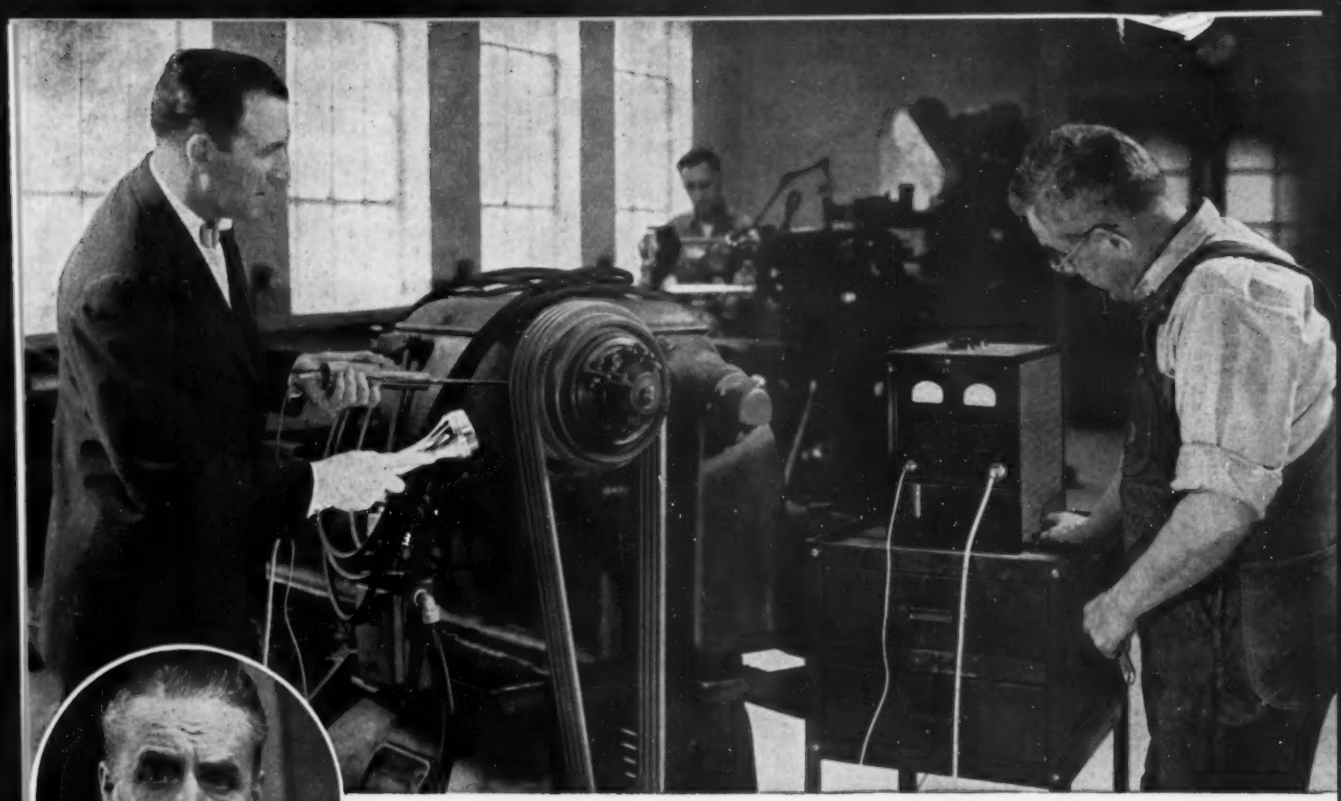
Versatile miller

Described by the manufacturer as "a complete milling department in one machine" a No. 2 horizontal universal knee type unit, is recommended for horizontal, universal, vertical or angular milling. It is powered by a 3 or 5 hp drive motor, providing a variety of speeds



to the horizontal spindle. The unit is equipped with a heavy-duty turret, which may be swiveled to accommodate the machine to universal milling operations. At the rear of the rectangular type overarm is mounted an independently driven vertical milling head, with power-feed to the quill. For vertical and angular milling, the vertical head is indexed into position over table. *U. S. Burke Machine Tool Div.*

For more data circle No. 76 on postcard, p. 189



"You say I can see vibration, measure it, and eliminate it?"

1 "How much vibration do you think my machine has?"

No need to guess—the Veelos Vibration Analyzer shows exactly! This amazing electronic tester measures vibration amplitude down to *2-millionths of an inch*—tests one belt against another, actually shows which belt has "invisible shakes" . . . and how much! Don't guess about vibration; it's costing you hard cash every minute you ignore it. Ask your Veelos salesman to test your belts with the Vibration Analyzer.

2 "Isn't vibration caused by a number of things?"

Vibration can be caused by bearings, motor, clutch, sheaves or V-belts. Quite often it is caused by V-belts alone. The Veelos Vibration Analyzer uses a "strobe" light which "stops" the motion—shows exactly *what* is vibrating! It shows you precisely how much vibration you're paying for, and lets you correct it. The Vibration Analyzer gives positive proof, and the test takes only 15 minutes. It's free, of course.

3 "How do I eliminate costly belt vibration?"

Install Veelos, in place of ordinary V-belts! V-belts have spots of varying density, due to their construction, which throw them out of balance. Veelos belts are absolutely uniform; every stud and link is identical; *every foot of the reel* is identical and uniform; and they're perfectly balanced! Test any belt for vibration against Veelos—you're in for a shock. Your Veelos salesman will show you how to cut costs and improve your operation.

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VEELOS
THE BALANCED
LINK V-BELT

Veelos is known as Veelink outside U.S.A.

For free vibration analysis or Veelos Data Book write to:

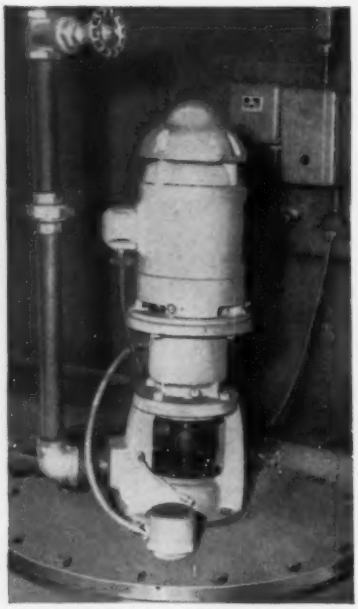
MANHEIM
Manufacturing & Belting Company
208 Stiegel St., Manheim, Pa.

"Industrial Belt Specialists Since 1911"

Adjustable to any length • Adaptable to any drive • Balanced power • Constant power • Vibrationless power

Solution

for a "PACKAGE" of Pump Problems



One of six Deming Turbine Pumps in condensate return service at The Morgan Engineering Company, Alliance, Ohio.

Deming Turbine Pumps

Plant engineers at The Morgan Engineering Company, Alliance, Ohio, leading manufacturer of cranes, presses and steel mill equipment, had a "package" of pump problems.

The Job was pumping hot condensate from steel sumps for return to steam boilers.

The Equipment included four obsolete condensate pumps with 3 HP electric motors and float controls.

The Problem was the failure of the original equipment to meet the job requirements efficiently and economically. Proper lubrication of the pump bearings was found impossible to provide. Frequent replacements of bearings and impellers was necessary. Float equipment gave almost constant trouble due to surges of steam. Here was a "package" of problems.

The Solution started by calling in the local Deming Distributor. Working "elbow to elbow" with the plant engineers, it was decided that Deming Vertical Turbine Pumps offered definite advantages.

1. The Deming Vertical Submerged Pumps with floatless controls eliminated the former float control troubles.
2. Only 2 HP electric motors were required by the Deming Turbine Pumps. The former condensate units required 3 HP motors.
3. Trouble in lubricating the bronze bearings of the condensate units was eliminated. Deming Turbine Pumps are self-lubricating (with the water flowing constantly through the pump when operating).
4. Using 1/3 less horsepower, the Deming Turbine Pumps did more work with a minimum of maintenance and at considerably less overall cost of operation.

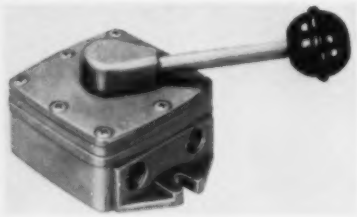
Ask your nearest Deming Distributor or write us for a free copy of illustrated BULLETIN 4700 on Deming Vertical Turbine Pumps.

THE DEMING CO. • 566 BROADWAY • SALEM, OHIO

CALL YOUR **DEMING DISTRIBUTOR** *for help on pumps!*

Valve controls chuck

Rotary disk-type hand operated pneumatic valve permits slow or rapid advance of chuck or tools. In one design, the double-acting cylinder carrying a chuck or tools can



be stopped in midstroke, balanced by air pressure on both sides. Also introduced is a new hydraulic cylinder with an externally removable and replaceable metallic gland. *Hannifin Corp.*

For more data circle No. 77 on postcard, p. 189

Cutting coolant

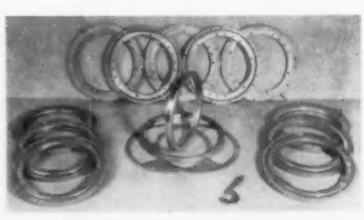
Featured at one display is a cutting coolant which is water-soluble, harmless to touch, non-flammable and not oily or greasy. It is reported to provide extreme pressure lubricity to improve tool performance and lengthen tool life. The product's anti-weld qualities assure continuous production and top efficiency. *Motch & Merryweather Machinery Co.*

For more data circle No. 78 on postcard, p. 189

Thin section bearings

A line of thin cross section bearings, having flanges on both inner and outer races with gear teeth cut on either inner or outer race are being exhibited by one manufacturer. Shown in the photograph is a bearing 5/8 in. wide, which has a gear cut on the outer race plus mounting holes on both the inner and outer race. *Kaydon Eng. Corp.*

For more data circle No. 79 on postcard, p. 189



Magnesium jigs and fixtures

New applications for magnesium tooling plates are showing up. Jigs and fixtures of the lightweight ma-

terial already are in use in many applications, including weld-fabrication of parts. *The Dow Chemical Co.*

For more data circle No. 80 on postcard, p. 189

Thread rolling attachment

A thread rolling attachment has recently been adapted for the precision rolling of taper pipe threads including dry seal. Either straight or taper threads can now be produced with the same attachment through the use of proper thread roll equipment and thread rolls. Five sizes with varying dimensions and pipe ranges are available. *Landis Machine Co.*

For more data circle No. 81 on postcard, p. 189

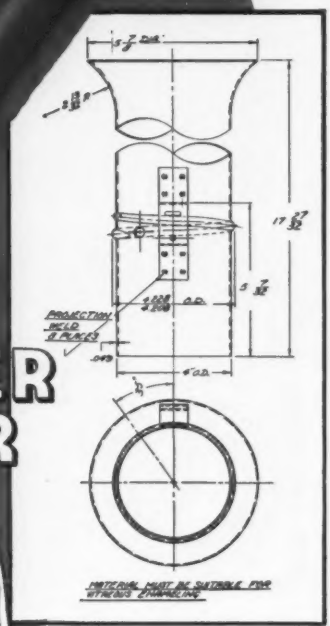
Casting resins

A flexible Epoxy resin, called L-940, described as suitable for drop hammer dies, is one of a group of materials exhibited by one manufacturer. This resin was developed to produce an exceptionally tough, resilient surface, which will compress and eliminate the need for metal clearance between punch and die. Other products to be shown include a brilliant white colored Gelkote material that provides excellent hanging properties, and a laminating resin which is a thermosetting modified compound described as having excellent dimensional stability. *Rezolin, Inc.*

For more data circle No. 82 on postcard, p. 189

Michigan
Electric Resistance
WELDED
STEEL
TUBING
Always makes possible Better products at lower Cost

CONDENSER
TUBE
for
WASHER
-DRYER



ROUND
¼" to 4" O.D. 7 to 22 gauge

SQUARE	Gauge	RECTANGULAR
½" to ¾"	16 thru 22	
¼" to 1"	11 thru 22	¾" minimum side to 5" maximum side
1" to 2"	11 thru 20	
2" to 3"	11 thru 18	

Carbon 1010 to 1025

Michigan Tubing has uniform strength, weight, ductility, I.D. and O.D., wall thickness, machinability, and weldability. It can be flanged, expanded, tapered, swaged, beaded, upset, flattened, forged, spun closed, fluted, and rolled. Available in a wide range of sizes, shapes and wall thicknesses, prefabricated by Michigan or formed and machined in your own plant.

...mant component of a new combination washer-dryer now on the market is this condenser tube fabricated by Michigan.

In the manufacture of this important tubular part, which helped make possible a major forward step in the development of an appliance for better living, Michigan engineers were required to solve a difficult production problem. The utmost design skill and fabrication accuracy were essential.

Refer to the drawing and note the expansion required for this part and the spiral bead—operations commonly and efficiently performed with Michigan's modern fabricating equipment. The bracket is projection welded to the tube in a single high production operation—another typical example why Michigan engineers and production workers cannot be excelled in the quantity manufacture of intricate tubular products at low cost.

Always consult Michigan first on any special tubular job requiring the greatest accuracy of product and economy of manufacture.

Michigan STEEL TUBE PRODUCTS CO.
RESISTANCE WELDED STEEL TUBING
THE OLDEST NAME IN ELECTRIC
Nearly 40 Years in the Business
9450 BUFFALO ST. • DETROIT 12, MICH.
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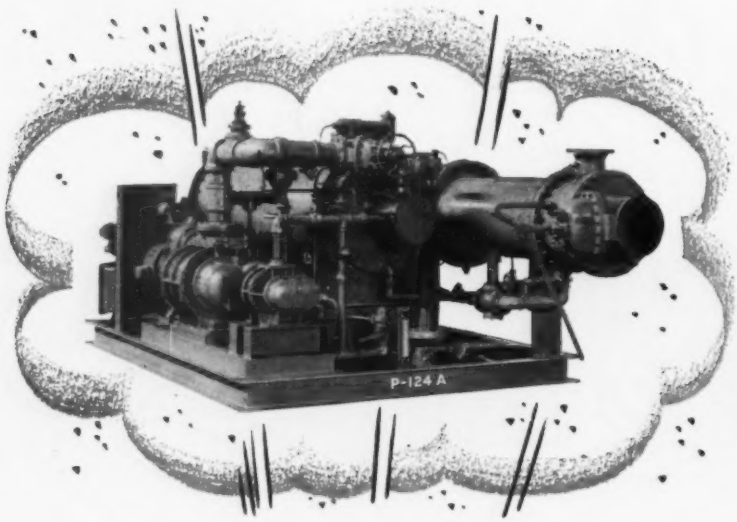
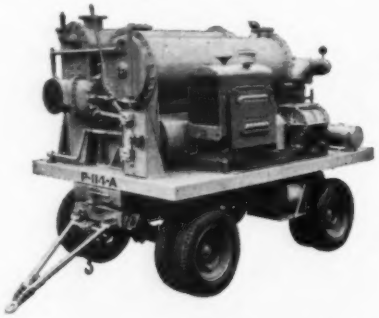


When PROTECTION is needed... call on R-C Inert Gas Generators

At a moment's notice of fire or explosion dangers, smothering gas flows instantly from Roots-Connersville Inert Gas Generators. From either stationary or mobile units, oxygen-free gas is constantly available for purging or other operations, to protect lives, property and production. Initial cost is low, no full-time operator is needed, and reduction of insurance premiums frequently offsets the original investment.

For details on how R-C Inert Gas Generators afford constant, instant protection, just call your nearest Roots-Connersville office or mail the coupon.



ROOTS-CONNERSVILLE BLOWER

A DIVISION OF DRESSER INDUSTRIES, INC.

356 Ohio Ave., Connersville, Indiana. In Canada—629 Adelaide St. W, Toronto, Ontario

Please send us Bulletin IGG-155 on fire and explosion protection with R-C Inert Gas Generators.

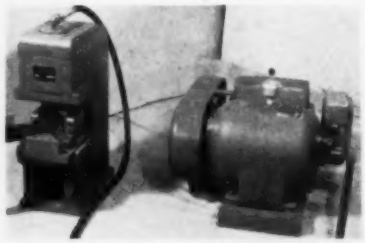
Name _____ Title _____

Company _____

Street and City _____

Portable hydraulic press

Hydraulic press weighing 300 lb exerts 35 ton pressure on small parts. Working space is 6¾ x 5¾ in. Stroke is 9/16 in. on standard model, and also is available with



1-in. stroke. Shut height is 4-9/16 in. Stroke, shut height and yoke specification may be varied to fit customer specifications. *Manco Mfg. Co.*

For more data circle No. 83 on postcard, p. 189

Electronic miller

An electronic airfoil milling machine which produces irregular three - dimensionally contoured parts, such as jet engine blades, vanes and buckets by copying a series of representative cross-sectional templates, is one of three new machines from one manufacturer. It features an interpolating system which enables the unit not only to duplicate the cross-sectional templates, but also generate the faired surfaces between and beyond these sections. *New England Tool and Machine Co.*

For more data circle No. 84 on postcard, p. 189

Tube cutter

Developed to provide a better method of cutting tube, this unit is reported to leave no burrs and waste no stock. By merely chang-

ing cutting adapters, the one machine will cut any length tube from ⅛ in. on up in diameters from ⅜ in. to 2¼ in. *Steel Products Eng. Co.*

For more data circle No. 85 on postcard, p. 189

Facilities of...
COMMERCIAL HEAT TREATERS
can cut YOUR costs

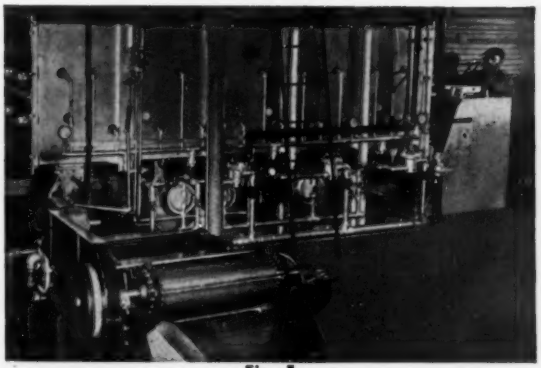


Fig. 1

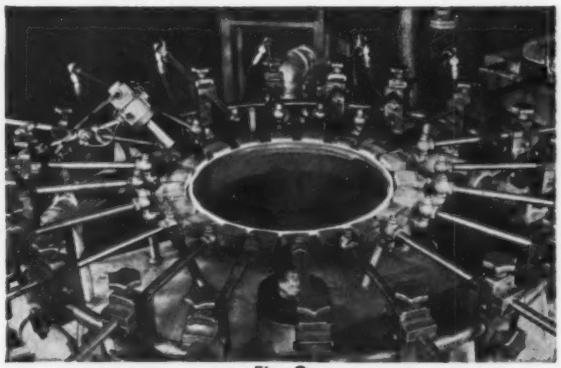


Fig. 2

An MTI commercial heat treater is located near you and is ready to serve your needs by performing "Custom-tailored" heat treating operations.

Because all members of the MTI are specialists with complete service facilities centralized in one plant, they are equipped to offer you a variety of heat treating processes—atmosphere hardening, carburizing, nitriding, annealing, cyaniding, etc.

For example, Fig. 1 shows an installation of a shaker hearth furnace with a continuous automatic quenching tank and a conveyor to a washing machine.

Fig. 2 illustrates a gas flame hardening unit featuring accurate temperature control and using two semi-circular gas manifolds mounted on movable carriages with 20 or more burner heads.

A further example of versatile and dependable equipment found in a commercial heat treating plant is seen in Fig. 3. The specially designed furnace conveyor belt carries over 35 lbs. per sq. ft. in normal service and sometimes as much as 5000 lbs. are loaded on it with pieces ranging from ½ lb. to 100 lbs. and temperatures up to 1650°.

Possessing such equipment together with many other specialized facilities and employing the trained personnel with technical knowledge and experience is the business of the commercial heat treater. Teamwork between you and the commercial heat treater can cut *your* costs.

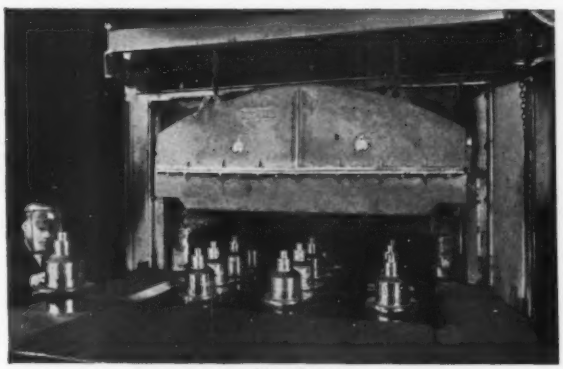


Fig. 3

WRITE FOR *the booklet called:*

"STRATEGIC USE of OUTSIDE HEAT TREATING FACILITIES CAN CUT COSTS."

***Consult any of these* HEAT TREATING SPECIALISTS**

Ace Metal Treating Corp.
Elizabeth, New Jersey
Allied Metal Treating Corp.
Kenosha, Manitowoc, Racine, Wisconsin
Anderson Steel Treating Co.
Detroit, Mich
B. & W. Precision Heat Treating Co.
Kitchener, Ontario, Canada
Benedict-Miller, Inc.
Lyndhurst, New Jersey
Bennett Heat Treating Co., Inc.
Newark 3, New Jersey
Commercial Metal Treating, Inc.
Bridgeport, Conn.
Cook Heat Treating Co. of Texas
Houston 11, Texas
The Dayton Forging & Heat Treating Co.
Dayton 3, Ohio
Dominy Heat Treating Corp.
Dallas, Texas
Drever Company
Philadelphia 33, Pennsylvania
Greenman Steel Treating Company
Worcester 5, Massachusetts
Fred Heinzelman & Sons
New York 12, New York

MTI
METAL TREATING INSTITUTE

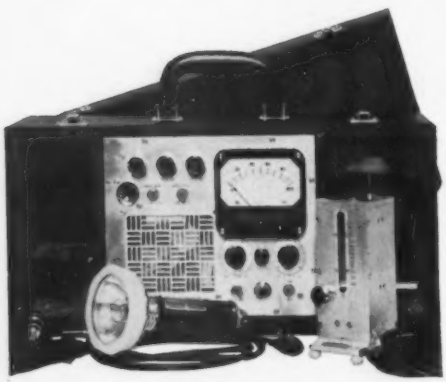
Alfred Heller Heat Treating Co.
New York 38, New York
Hollywood Heat Treating Co.
Los Angeles 38, California
L-R Heat Treating Company
Newark, New Jersey
The Lakeside Steel Improvement Co.
Cleveland 14, Ohio
Metallurgical, Inc.
Minneapolis 14, Minnesota
Metallurgical, Inc.
Kansas City 8, Missouri
Metlab Company
Philadelphia 18, Pennsylvania

Metro Heat Treat Co.
New York 13, New York & Ridgefield, N. J.
New England Metallurgical Corp.
South Boston 27, Massachusetts
Paulo Products Company
St. Louis 10, Missouri
Pittsburgh Commercial Heat Treating Co.
Pittsburgh 1, Pennsylvania
The Queen City Steel Treating Co.
Cincinnati 25, Ohio
J. W. Rex Company
Lansdale, Pennsylvania
Stanley P. Rockwell Company
Hartford 12, Connecticut
C. U. Scott & Son, Inc.
(Stainless Steels)
Rock Island, Illinois
Standard Steel Treating Co.
Detroit 10, Michigan
Syracuse Heat Treating Corp.
Syracuse, New York
Winton Heat Treating Company
Cleveland 16, Ohio

This advertisement sponsored by these Companies which are members of the Metal Treating Institute.

ElecΦdyne

Static-Dynamic Balancing Machines for accurate, high speed production line balancing.



Vibrodyne

with exclusive tunable pick-ups

. . . a new concept in Vibration Analysis and Correction for "in-place" balancing with unmatched speed and accuracy.

Get the facts first hand. Put OLSEN—BOOTH 566 at the top of your "MUST SEE" list for the A.S.T.E. show, or if you can't attend, write for descriptive literature.

TINIUS Φ OLSEN
Testing & Balancing Machines

TINIUS OLSEN TESTING MACHINE CO.
2120 Easton Road · Willow Grove, Pa.
Leadership in Testing Since 1880

Flexible, high speed riveter

New rivet setting machine is to be unveiled at the ASTE show. Its 12-in. throat depth provides sufficient flexibility to handle a wide variety of rivet applications at high speeds. The machine can be used with full tubular, semitubular or split rivets. Largest rivet used is ¾ in. long with a 3/16 in. shank. Quick change hopper feed mechanism, Horton type roller clutch and electric motor drive are incorporated. *The Milford Rivet & Machine Co.*

For more data circle No. 86 on postcard, p. 189

Nutrunners

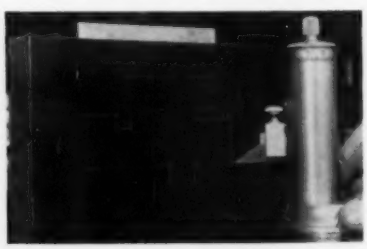
Torsion bar torque control units designed to run nuts to a preset torque are reported to offer the first application of this principle for torque controlled nutrunning. The tools have multiple torque set-

tings that are changed with an adjusting collar and torque jig. One of two sizes available at the show for demonstration, the unit shown is for torques up to 90 ft lb. *Ingersoll-Rand Co.*

For more data circle No. 87 on postcard, p. 189

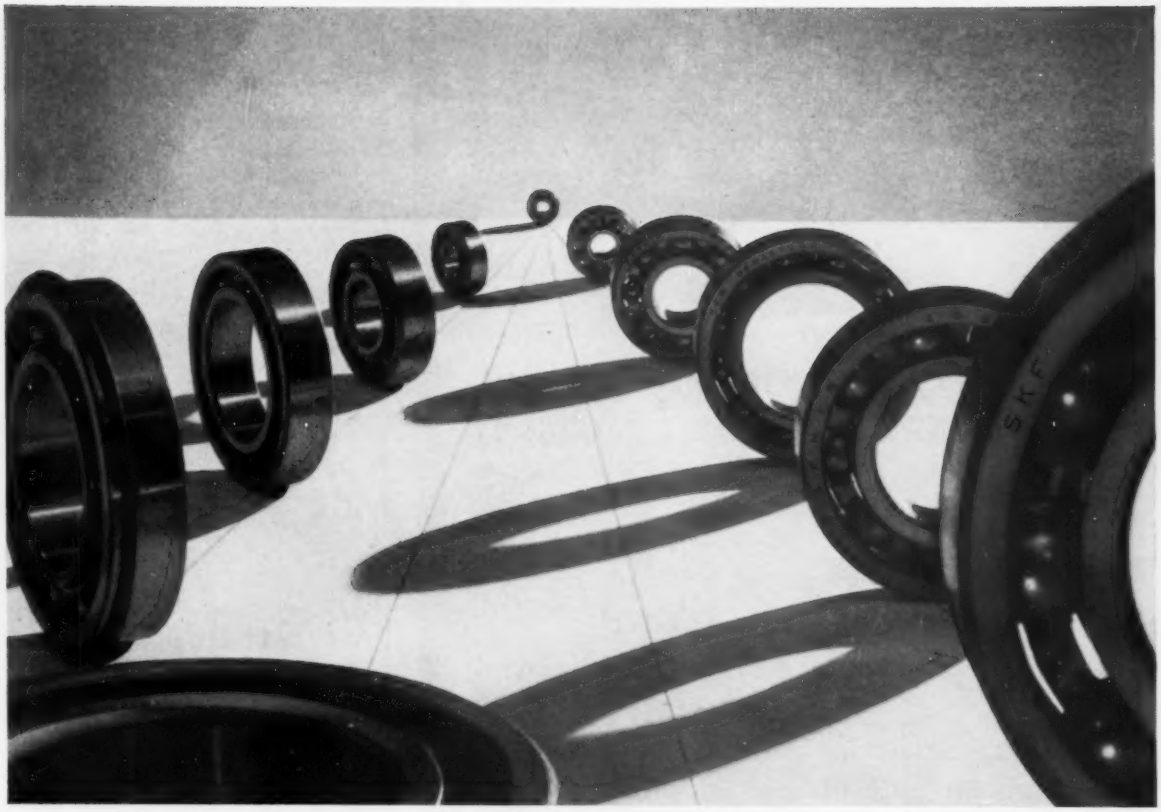
Micro-height gage

A gage (shown in layout work) combines the scribing features of a Vernier height gage with quick reading figures. Its capacity can be increased by 3 in. by putting



scriber at top of support. For inspection jobs the scriber is replaced with user's dial indicator. *Greist Mfg. Co.*

For more data circle No. 88 on postcard, p. 189



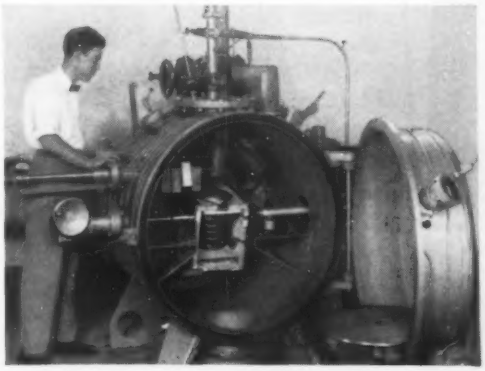
Will Vacuum Melted Metals do for YOUR Product what they do for Ball Bearings?

A Vacuum Furnace will help you get the Answer

Vacuum melted steels are consistently free of inclusions and exceptionally clean. As a result they provide for ball bearings:

1. Bearing life consistently 100% to 200% better than handbook ratings for normal temperature operations.
2. Bearing life consistently up to 600% longer for high temperature, high speed applications.
3. Up to 90% reduction in bearing race rejects.

Would metals with such characteristics make *your* product better? A vacuum furnace will enable you to develop materials especially suited to your needs. We have made and operated more high vacuum furnaces than any other manufacturer in the world. Can we help you, too? Send coupon below today.



NRC Model 2555 Vacuum Furnaces are now being used by aircraft companies, engine manufacturers, investment casters, specialty steel producers to speed up development of new materials that will meet ever more severe operating requirements.

Other NRC high vacuum products include: analyzers, dehydrators, freeze driers, impregnators, gauges, metallizers, pumps, valves.

NRC
EQUIPMENT DIVISION

NRC EQUIPMENT DIVISION
NATIONAL RESEARCH CORPORATION
Dept. 163, Charlemont Street, Newton Highlands 61, Massachusetts

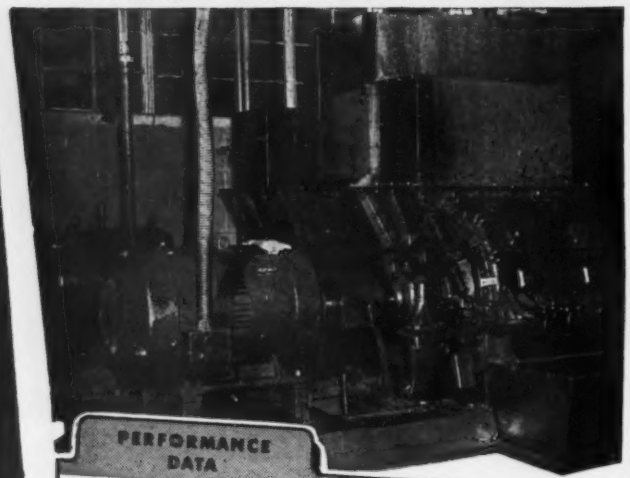
Please send me Model 2555 Data Sheet ☐ NRC Vacuum Furnace Bulletin ☐
Have your representative call ☐

Name.....Title.....
Company.....
Address.....
City.....Zone....State.....

More "CRUSHING" FACTS ON American CRUSHER PERFORMANCE

Case History No. 15

$60,000 ANNUAL GROSS PROFITS! WITH TWO AMERICAN METAL TURNINGS CRUSHERS



PERFORMANCE DATA

TWO CRUSHERS:	Model 3800's
AVERAGE AGE:	35 months
MONTHLY TONNAGE:	1200–1500 tons metal turnings
PARTS COST:	to date, for both crushers: $1599.80
COST PER TON:	$0.03, including standby parts

THE experience of many blue chip manufacturers have shown that there are three important profit sources in every American installation: (1) American-reduced chips bring $4 more per ton on scrap market (2) Up to 50 gallons of recovered cutting oil per ton of reduced turnings (3) less storage . . . easier handling.

Let American show you how you can turn your scrap into profit.

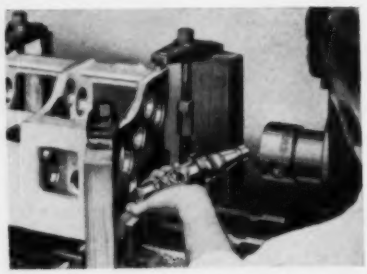
WRITE for Bulletin: "Metal Turnings Crusher."

American PULVERIZER COMPANY

1439 MACKLIND AVE., ST. LOUIS 10, MO.

Tool holders

A line of "flash-change" tool holders, designed to provide maximum rigidity for all types of drilling, boring and milling operations and tools, are reportedly capable of being changed in a matter of seconds. Boring bars and adapters

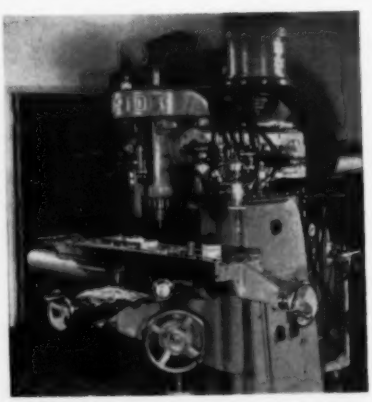


are located radially in the tool holders by means of driving keys, thus insuring positive repositioning of tools. The tooling system includes a comprehensive range of standard boring bar sets and a full complement of adapters for drilling and milling operations. *De-Vlieg Microbore Co.*

For more data circle No. 89 on postcard, p. 189

Tracer for miller

Utilizing a tracing instrument, a vertical milling machine has three

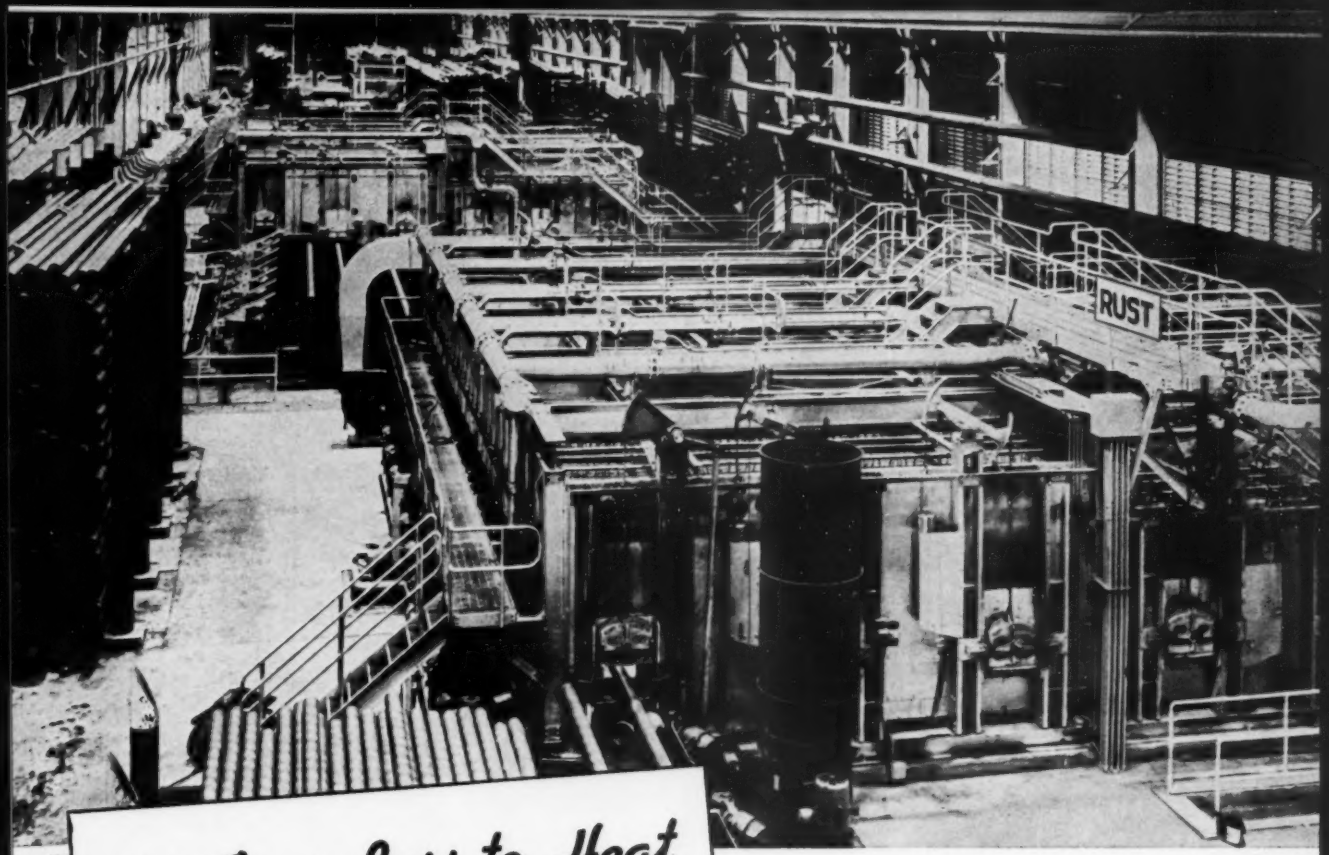


dimensional motion plus the added feature of retaining the existing manual feed screws. *True-Trace Sales Corp.*

For more data circle No. 90 on postcard, p. 189

Power cylinders

A line of power cylinders now offer these features: case hardened,



116 Tons Less to Heat in this roof

because of B&W Insulating Firebrick suspended construction

Here's another case where light weight means lower cost. The roof of this walking beam furnace is 2,320 square feet. B&W Insulating Firebrick suspended construction for a 9-inch roof weighs about 30 lbs per square foot, including the weight of rods, hangers, pipe, brick and mortar. This is approximately 100 lbs per square foot less than an arch constructed of heavy firebrick plus insulation having the same heat flow. *This saving means the B&W IFB roof is 116 tons lighter.*

The new walking beam furnace (shown in photograph above) was designed and constructed by Rust Furnace Company for Jones & Laughlin Steel Corporation. Seamless pipe is conveyed into the furnace, moves slowly from left to right on walking beam rails designed and furnished by York-Gillespie Mfg. Co., and passes out the exit door.

Here are the money-saving benefits of B&W suspended construction:

1. Supporting steel is less massive, far less costly. Commercial size steel can be used for roof suspension instead of special castings.

2. B&W Insulating Firebrick heat up and cool down faster. This means lower fuel costs, faster inspection.

3. Furnace temperatures can be changed quickly. When different steels call for different heating schedules, the furnace temperature can be adjusted in minutes instead of hours.

4. Installation costs are lower because these lightweight brick can be handled faster and easier than ordinary heavy firebrick.

For complete information on B&W IFB—the *lightest* weight insulating firebrick, write to B&W today or call your local Refractories Engineer.

This is a cross-sectional drawing of a typical suspended arch arrangement using B&W Insulating Firebrick. It can be used in flat or sloping roofs, nose arches and many other types of suspended furnace construction.

BABCOCK & WILCOX

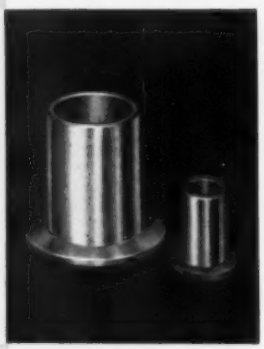
THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42nd ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

R 535

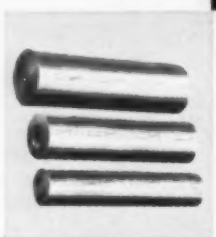
THIS *new*

BEARING SERVICE HELPS YOU IN MANY WAYS

The development of a complete standardized line of stock Sintered Bronze Bearings and Bars by Bunting opens the door to many economies and advantages in production and maintenance of machinery and mechanical components.



Here is a far more complete range of standard sizes than has heretofore been available in this material. Bunting's powdered bronze stock line is the first to include all ASTM standard sizes to ASTM recommended dimensions and tolerances in both plain and flanged bearings and thrust bearings.



Together with the long established Bunting stock line of Cast Bronze Bearings and Bars, these new sintered bronze Bunting products bring to mechanical industry ready-to-use bearings that will squarely meet your blue print and cost requirements.

Both Bunting Cast Bronze and Bunting oil filled, self-lubricating sintered powdered Bronze Bearings and Bars are available to you through your nearest Bunting Distributor. He has in stock all sizes for your immediate needs. Ask him or write for complete lists and dimensional data on Bunting Cast Bronze and Bunting Sintered Bronze Bearings.

Bunting®

BUSHINGS, BEARINGS, BARS AND SPECIAL PARTS OF CAST BRONZE AND POWDERED METAL

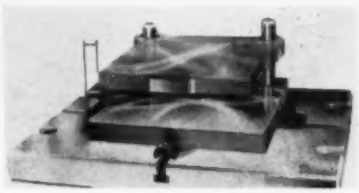
The Bunting Brass and Bronze Company, Toledo 1, Ohio
Branches in Principal Cities • Distributors Everywhere

chrome plated piston rods; Teflon rod wipers and Teflon hydraulic rod seals; rust-resistant black ferric oxide finish on cylinder heads, caps, mountings, pistons, followers, tie rods, and the unplated portions of the piston rods. The manufacturer is also showing double-acting reciprocating boosters which with shop air, cycles continuously to supply a constant flow of oil for hydraulic cylinder operation and a threaded seal-fitting that eliminates leaks of oil, air, gas, water or chemical fluids at pipe threads and other threaded connections. *Miller Fluid Power Co.*

For more data circle No. 91 on postcard, p. 189

Die sets and supplies

A complete new line of die sets and diemakers' supplies have been developed which are described as incorporating the following advantages and others: precision lapped chrome-plated guide posts; demountable bushings available as an optional feature; oil fittings positioned so they are easily reached from front or side of the press; complete new line of long and short shoulder bushings. Photograph is view of die set on bolster plate indicating clamping method devised to provide additional die space. *Danly Machine Specialties, Inc.*



For more data circle No. 92 on postcard, p. 189

Heat process equipment

Development of controlled heat process equipment as machine tools is the theme of one firm's show exhibit. They are operating a high-speed pusher-type furnace for automatic heating of metal slugs for hot forming. Automatic feed and delivery, as well as automatic temperature control, will be demonstrated. Stainless steel slugs will be fed into the furnace and deliv-

FIELD REPORT: NO. 91

WHICH DIE STEEL WOULD YOU USE HERE to increase production from 100 to 23,000 parts?

Even after trying many different die steels, production averaged only about 100 pieces before this ring die had to be replaced.

The die cold forms cups as the first operation in producing rocket projectile noses from SAE 1010 Steel. Even though the ring die is press fitted into a four foot diameter hardened retainer ring (Rc. 34/36), the 1700 tons of pressure exerted in power extrusion prematurely stretches the die. The 12 lb. 2 oz. cups must be held within .2 of a lb. and wall thickness within .010".

Which die steel would you specify in a move to cut replacement costs and improve production?

From our customer Field Report files, here's how the toolroom solved the problem. The Carpenter Matched Set Method showed that Carpenter VEGA (Air-Tough) Die Steel was a natural for the job. Latest report shows that the VEGA ring die had increased production from 100 to 23,000 cups, and is still banging them out.

What better guarantee of success can you find for your own jobs than the word of hundreds of toolroom men who rely on Carpenter. Why settle for "ordinary" results when Carpenter is ready to help you explore the possibility for improvement? Call your nearest Carpenter Mill-Branch Warehouse, Office or Distributor now. *The Carpenter Steel Co., 121 W. Bern St., Reading, Pa.*

How can <u>your</u> toolroom use Carpenter Matched Tool and Die Steels to:

Reduce hardening hazards
Minimize machine downtime
Boost output per grind
Improve product quality

A S T E Visit Our Booth INDUSTRIAL EXPOSITION INTERNATIONAL AMPHITHEATRE CHICAGO ..... MARCH 19-23, 1956

Carpenter STEEL

Matched Tool and Die Steels

IMMEDIATE DELIVERY from local warehouse stocks — Export Address: Port Washington, N. Y. — "CARSTEELCO"

ered at frequent intervals at forging temperature. The company will also have on exhibit equipment for machine brazing soldering, automatic hardening and annealing and selective flame hardening. *Selas Corp. of America.*

For more data circle No. 93 on postcard, p. 189

Chip-free steel grit

Brittle carbides are eliminated from this new steel grit blast cleaning abrasive, which means less chipping of grit on impact. Sharp edges remain undulled for hundreds of cycles. The specially heat

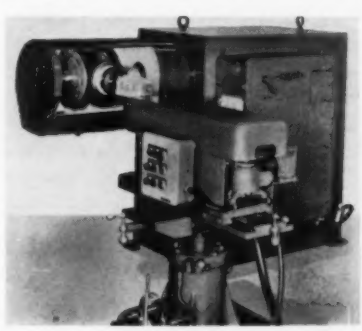
treated grit is suggested for deep etching, matte finishing, and descaling. Seven sizes are available, screened to SAE specifications. *Wheelabrator Corp.*

For more data circle No. 94 on postcard, p. 189

Power brushing

With a line of semiautomatic brushing machines (one unit illustrated) the job of the operator is described as merely placing the workpiece on the work-holding fixture. After brushing is completed, he removes work and substitutes another. *The Osborn Mfg. Co.*

For more data circle No. 95 on postcard, p. 189



Fire Safety In Action . . .

You're looking at an "Automatic" SPRAY Sprinkler an instant after fire has triggered it into action. The deluge of water will snuff out a blaze before it has a chance to gain headway. Millions of these ingenious devices provide a 24-hour-a-day fire watch in tens of thousands of industrial, commercial and institutional buildings throughout the land.

You, too, should let "Automatic" Sprinklers serve as your personal fire department. They will afford you the best practical measure of fire safety with the least effort, expense and interference with your business operation.

Complete descriptive literature now available.
For data on "Automatic" Sprinkler systems, write for Bulletin 66.
For data on SPECIAL HAZARD Fire Protection, write for Bulletin 73.

"Automatic" Sprinkler
CORPORATION OF AMERICA
YOUNGSTOWN, OHIO

Offices In Principal Cities of North and South America

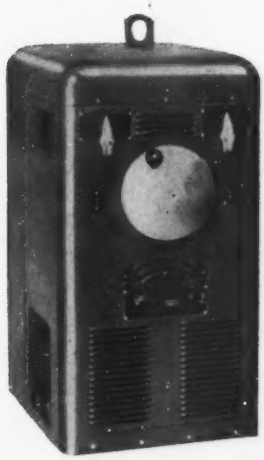
When one welder gives both AC and DC . . .

Handles every type of electrode . . .

Yet costs less to buy and operate . . .

WHY

shouldn't you be using IDEALARCS for your production welding.



IDEALARC . . . *one efficient welder for all your jobs.*
Furnished as an AC/DC welder or as a straight AC welder to which DC can be added at any time.

IDEALARC . . .

industry's most versatile welder

Certain electrodes work best on AC . . . others operate better on DC. Some rods that work best on DC in the smaller sizes work best on AC in the larger sizes. With still other rods, the opposite is true. IDEALARC, with its instant selection of AC or DC, gives optimum performance on every type and size of electrode.

There is no other welder like it

THE LINCOLN ELECTRIC COMPANY
Cleveland 17, Ohio

ONE DEPENDABLE SOURCE FOR ALL YOUR WELDING NEEDS

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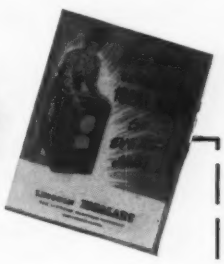


THE LINCOLN ELECTRIC COMPANY
Dept. 1515,
Cleveland 17, Ohio

☐ Send me Bulletin 1343 on Idealarc.
☐ Have representative call.

Company_____

Address_____

City_____ State_____

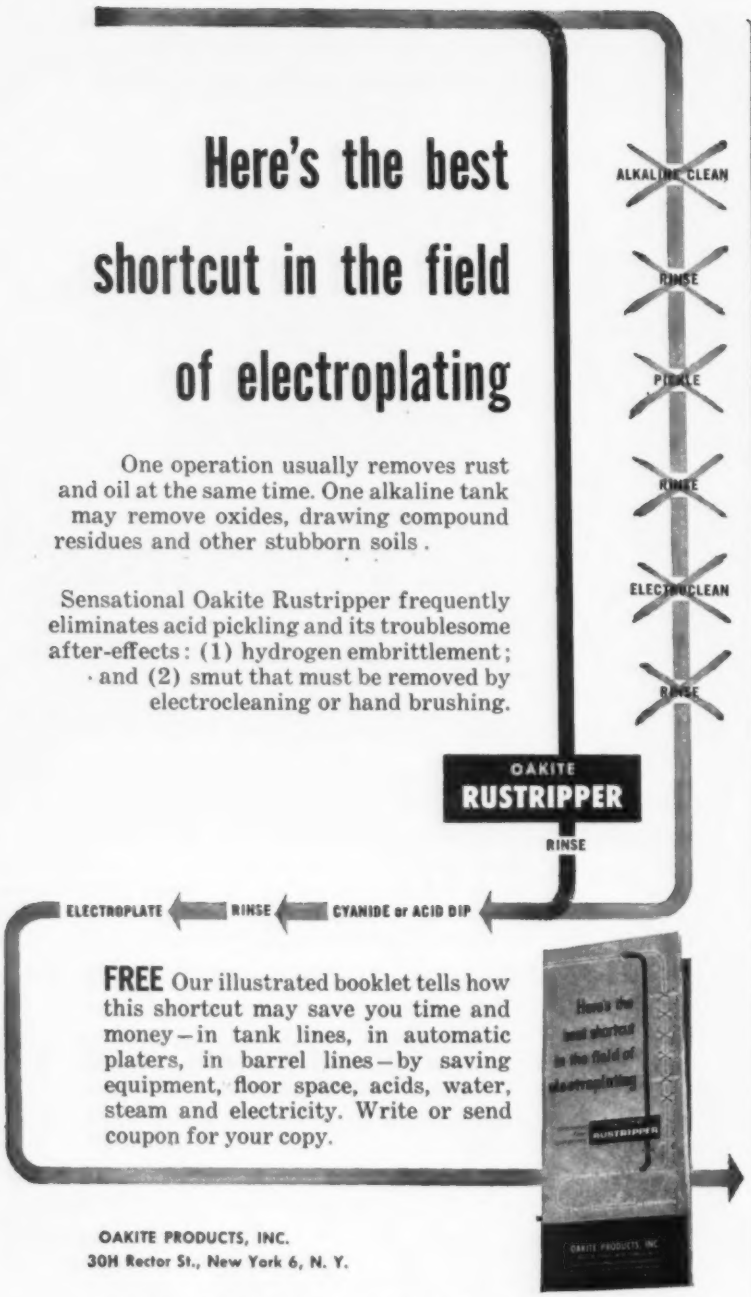
Name_____

Position_____

Here's the best shortcut in the field of electroplating

One operation usually removes rust and oil at the same time. One alkaline tank may remove oxides, drawing compound residues and other stubborn soils.

Sensational Oakite Rustripper frequently eliminates acid pickling and its troublesome after-effects: (1) hydrogen embrittlement; and (2) smut that must be removed by electrocleaning or hand brushing.



FREE Our illustrated booklet tells how this shortcut may save you time and money—in tank lines, in automatic platers, in barrel lines—by saving equipment, floor space, acids, water, steam and electricity. Write or send coupon for your copy.

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Send me a FREE copy of your booklet *"Here's the best shortcut in the field of electroplating"*

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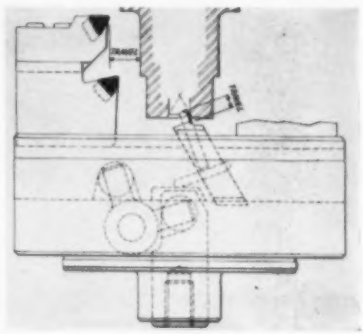
Drill speeder

A speeder to be shown at the ASTE exhibit is reportedly designed to permit small-hole drilling to be done on a turret lathe. The unit contra-rotates the drill (relative to lathe spindle rotation) at the proper surface speed. Rate of feed may be increased in approximate proportion to the increase in surface speed. This is reported as meaning that many drilling operations may now be performed efficiently and economically on a turret lathe. *Ward Riddle Co.*

For more data circle No. 96 on postcard, p. 189

Multi-purpose tool

Four operations at once with this tool: two diameters milled, a shoulder cross faced and a 60° included center generated, all simultaneously. Cutting elements are



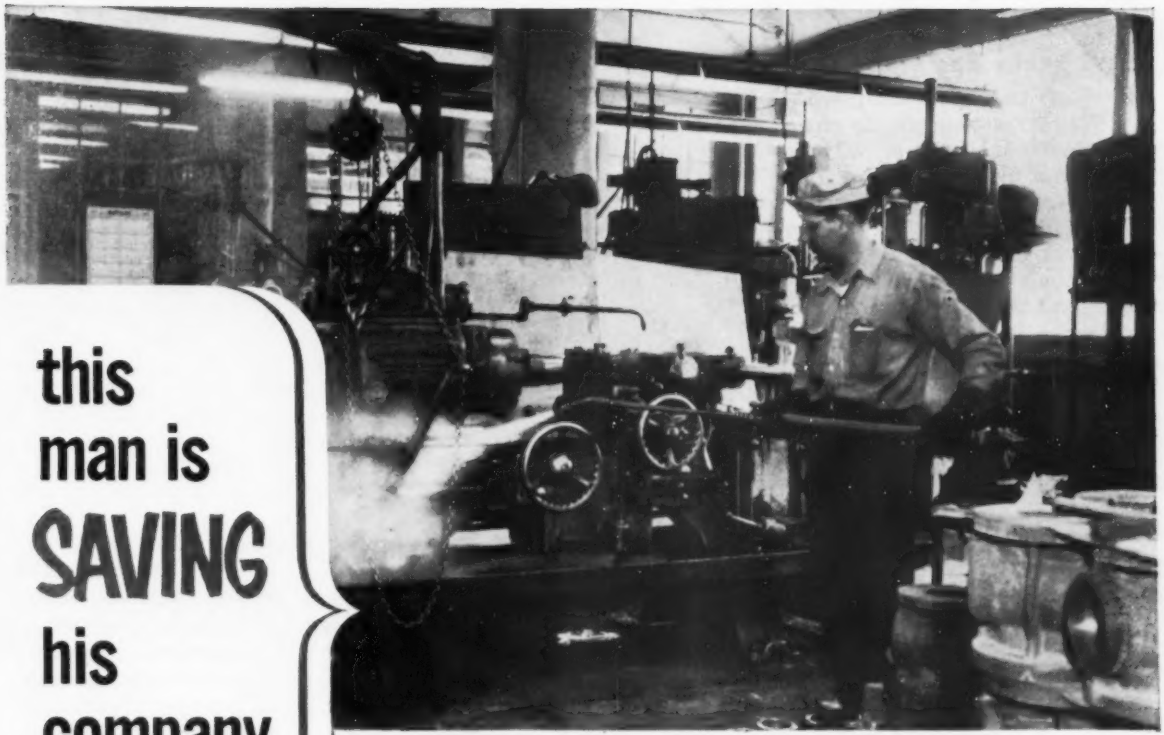
standard triangular carbide inserts, clamped with a set screw. Setup time is minimized. Inserts need be sharpened only on the end. *The Gairing Tool Co.*

For more data circle No. 97 on postcard, p. 189

Milling machine

An electronic airfoil milling machine is described as producing irregular three-dimensionally contoured parts, such as jet engine blades, vanes and buckets by copying a series of representative cross-sectional templates. Its interpolating system enables it, the maker states, to not only duplicate the templates, but also generate the faired surfaces between and beyond these sections. *Pratt & Whitney Co.*

For more data circle No. 98 on postcard, p. 189



this man is SAVING his company money...

SPEEDING PRODUCTION

He's stripping oily grime from machine tools with Hypressure Jenny *before repairs or repainting.* He's *saving his company* money, because he is doing the job in one-sixth of the time taken by hand methods. Also it is a known fact that when mechanics work on clean equipment, unhampered by grease and grime, production steps up . . . job time is shortened . . . costs are reduced.

But that's only half of it!

Besides cleaning all types of production machinery, tools and equipment, Jenny saves up to 90% of the time and labor costs of cleaning floors, walls, windows, and lavatories . . . reduces fire hazard; increases plant safety; and speeds production through better working conditions.

If you would like to know more about HYPRESSURE JENNY STEAM CLEANER and the many ways it can save your company money . . .

WRITE, OR MAIL THE COUPON TODAY! No Obligation.

HYPRESSURE STEAM **Jenny** CLEANER

Without obligation send me complete information on HYPRESSURE JENNY STEAM CLEANER

Name_____ Title_____

Company_____

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City_____ State_____

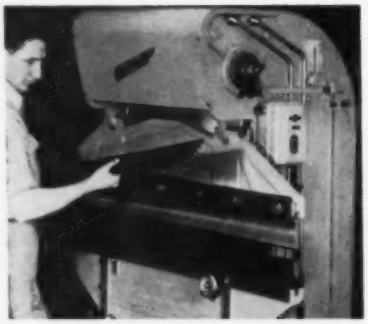
HYPRESSURE JENNY DIVISION **HOMESTEAD VALVE MANUFACTURING COMPANY**

P. O. BOX 23 "Serving Since 1892" CORAOPOLIS, PA., U. S. A.

Press brake has stroke control feature

Featuring stroke control, a new 12 ton hydraulically operated press brake has 48 in. length of bed and ram. With the stroke control, the most practical length of stroke for each job can be preset. The shorter the length of stroke, the greater the production efficiency, the maker claims, and the more safety to the operator. Converts into a bar or tube bender. *O'Neil-Irwin Mfg. Co.*

For more data circle No. 99 on postcard, p. 189



POPE PRECISION SPINDLES

Of Special Interest and Value To All **TOOL ENGINEERS**

See these Spindles at Federal Machinery Sales Co., Booth No. 392, ASTE Show

EXHIBIT A

POPE SUPER-PRECISION, HEAVY DUTY BORING SPINDLES for boring holes round within millionths of an inch. Available in both belt driven and motorized units to meet a wide range of speeds and horsepower. Send us your specifications for quotations.

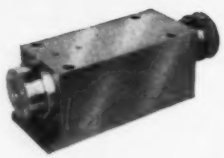


EXHIBIT B

POPE 1 HP, TOTALLY ENCLOSED 3600 RPM MOTORIZED, CARTRIDGE TYPE PRECISION SPINDLES with double row cylindrical roller bearings and separate thrust bearings for no endwise movement of the shaft

EXHIBIT D

POPE HEAVY DUTY, ¾ TO 100 HP DIRECT MOTORIZED SPINDLES for Horizontal or Vertical Skin Milling, Grinding, Milling, Boring and Other Operations

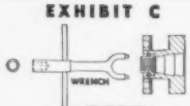
EXHIBIT F

POPE HEAVY DUTY VEE-BELT DRIVEN, PRECISION MILLING SPINDLES, and Wheel Heads, ½ to 50 HP

EXHIBIT G

POPE INTERNAL GRINDING SPINDLES for Bryant, Excello, Heald and Landis Grinders.

EXHIBIT C



NEW **POPE** QUICK, SELF-REMOVING WHEEL HOLDER for surface grinders and tool and cutter grinders — eliminates the necessity of a wheel puller. Write for quotations.

EXHIBIT E

POPE SUPER-PRECISION MOTORIZED TOOL AND CUTTER GRINDER SPINDLES with clearance Angle Swiveling Heads for *Angular Adjustment In A Vertical Plane*

EXHIBIT H

POPE SUPER-PRECISION HIGH FREQUENCY HEAVY DUTY GRINDING AND MILLING SPINDLES for speeds up to 100,000 RPM

No. 107

WRITE FOR COMPLETE SPECIFICATIONS, PRICE AND DELIVERY

Specify **POPE** PRECISION SPINDLES

POPE MACHINERY CORPORATION
Established 1920
261 RIVER STREET · HAVERHILL, MASSACHUSETTS

Measuring machine

A new universal measuring machine for ultra-precise measurement and inspection will be featured at one firm's booth. It is described as offering for the first time a unit combining the capacity for larger workpieces; choice of electronic indicator supported on a rotatable spindle, or a universal microscope for pickup; and a combination of rectilinear and angular positioning making possible the measurement of complex contours. The machine has a work capacity of 11 in. x 18 in. x 12 in. height. *Moore Special Tool Co.*

For more data circle No. 100 on postcard, p. 189

Marker

A new automatic marking printer is designed for work on bars, tubes, pipe, non-collapsible hose and heavy wire. The unit has been developed for production-line marking of from ½ to 6½ in. diam stock, in any length, at speeds up to 300 linear fpm. *Jas. H. Matthews & Co.*

For more data circle No. 101 on postcard, p. 189

Abrasive belt grinder

A new model multiple-head abrasive belt grinder is designed for wet or dry grinding and polishing of ferrous, non-ferrous, plastic and other materials. It is especially recommended for grinding and deburring flat surfaces on a high volume basis. Special adaptions include a turnover conveyor setup, with grinding heads installed on different levels, so that both sides of a part are processed on a single unit. *Engelberg Huller Co.*

For more data circle No. 102 on postcard, p. 189

Interferometer

Measurement to 0.000003 in. and/or 0.1 second of arc are described as being made with a portable alignment interferometer displayed at the show. Reported as the first instrument of its kind ever demonstrated, the unit, according to the manufacturer, is designed for tolerance work on a scale previously limited to the laboratory. *Bausch & Lomb Optical Co.*

For more data circle No. 103 on postcard, p. 189

you can produce 3 times as much with a Baldwin powder metal press

It's a proven fact. One leading manufacturer of ferrite parts is getting 3 times as many pieces per hour from his Baldwin as from any other press in the shop, and his experience is not unusual. Chances are you can do the same, whether you're compacting with iron, steel, brass, bronze or other metals.

The Baldwin is a 4-column crank-type machine, the only one of its kind on the market. Because of its extreme rigidity, and because there's no problem of tool misalignment, this press can be operated faster than any other. Additional advantages you get with a Baldwin are:

- **Closer tolerances. Length tolerances to ±.001" are common.**
- **Less finishing required.**
- **Better appearance.**
- **Less metal required.**
- **Much longer die life.**

Baldwin builds a complete line of powder metal presses, from 75 to 300 tons capacity, so whatever your requirements there's a right size for your operation. Why not find out how these modern heavy-duty presses can increase *your* production? For a copy of our new bulletin, write BLH Corporation, Philadelphia 42, Pennsylvania.

BALDWIN BLH LIMA-HAMILTON

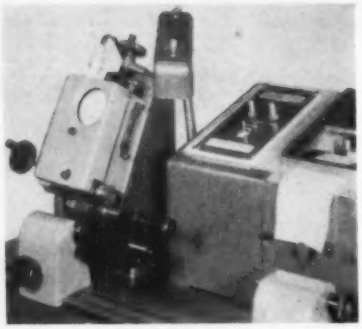
EDDYSTONE DIVISION
BALDWIN-LIMA-HAMILTON

DIVISIONS: Austin-Western • Hamilton • Lima • Eddystone • Electronics & Instrumentation • Loewy-Hydropress • Madsen • Pelton • Standard Steel Works

Precision gear checker

Fine-pitch precision gears are checked easily on this recently refined equipment. Composite check records all errors simultaneously on moving paper roll. Errors can be amplified 200, 400 or 800 times. Speed of rotation and work pressure are adjustable for best operating conditions. *The Fellows Gear Shaper Co.*

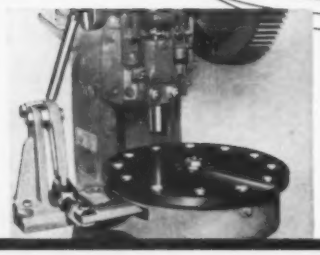
For more data circle No. 104 on postcard, p. 189



How to CUT Labor Costs!

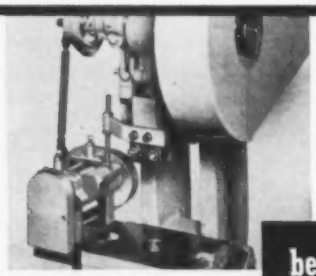
Automate YOUR PRESENT benchmasters AND OTHER PRESSES!

With these additional Benchmaster products you can easily convert your present production lines to full or semi-automation at minimum cost!



benchmaster AUTOMATIC DIAL INDEX FEEDS Converts punch presses or drill presses to high speed automatic operation. Avoids expensive investment in single-application machines. Excellent for marking, assembling, reaming, trimming, crimping, etc. Up to 6000 strokes per hour! Easy 4 bolt mounting. 12", 15" table diameters. Up to 24 stations. Other sizes on request.

benchmaster KOIL KRADLE-STRAIGHTENER COMBINATIONS (Available singly or in combination) Automatically *feeds* and straightens coil stock – even in foil thicknesses supplying *any* machine from a slack loop. Equipped with variable speed drive. Quick disengage lever releases top rollers ...instantly shuts off entire unit. Many width and thickness capacities. Ask for recommendations.



benchmaster AUTOMATIC FRICTION ROLL FEEDS – The *one* roll feed that can't be beat for performance at low cost. Feeds cloth, cork, paper, metal, etc. Fits new or old Benchmasters and other presses. Height adjustment levels rollers with die. Roll lifters automatically release grip after each stroke for accurate positioning. Ground, knurled or rubber covered rolls in 3, 5, 7 and 9" widths. Strokes: 0 to 3" cut-off and 0 to 6" cut-off

benchmaster

World's largest manufacturer of small punch presses and mills.

1825 W. Rosecrans Avenue, Gardena, California

ASTE SHOW EXHIBITORS LIST

The 1956 American Society of Tool Engineers Show and Industrial Conference will be held in International Amphitheatre, Chicago, March 19 to 23. Show hours Monday, Tuesday, Thursday and Friday are 9 a.m. to 6 p.m. Hours on Wednesdays are 9 a.m. to 10 p.m.

Exhibitor	Booth
A A Gage Company	121
Abrasive Engineers	1615
Ace Drill Bushing	175
Ace Drill Corp.	233
Acme Steel Co.	178
Acme Tool Co.	402
Adamas Carbide Corp.	145
Adcock & Shipley, Ltd.	415
Alameda Gage Co.	1720
Alemite Division, Stewart Warner Corp.	1216
Allegheny Ludlum Steel Corp.	588
Allen Tool Co., A Div. of Allen Ind.	729
Allied Witan Co.	908
Almco Supersheen, Div. Queen Stove Wks.	704
Alpha Molykote Corp.	303
American Aerator Co.	1817
American Cam Co.	529
American Coldset	205
American Cystoscope Makers, Inc.	285
American Drill Bushing Co.	428
American Herforder	619
Amer. Mach. & Foundry, Wahlstrom Float Lock & Lowerator Div.	153
Amer. Positive Grip Vise	1715
American Pullmax Co.	689
American Sip Corp.	405
B. C. Ames Co.	934
Ampco Metal Inc.	204
F. E. Anderson Oil Co.	467
R. B. Annis Co.	1214
Apex Tool & Cutter	174
Program Development, Armour Res. Found. of Illinois Inst. of Technology	504
Armstrong Bros. Tool	1324
Aro Equipment Corp.	638
Arrow Tool & Reamer	645
Arwood Precision Casting Corp.	661
Ateliers Marcel Pegard	317
Atlas Press Co.	1418
Austenal Labs Inc., Microcast Div.	916
Austin Industrial	550
Automotive Ind.	1531
BMT Mfg. Co.	709
Eric R. Bachmann Co.	1301
Bakelite Company	397
Balance Engineering	1111
Banner Welder, Inc.	763
Barer Engineering & Machinery Co.	1424
Barker Engineering	731
Barnes Drill Co.	1127
Carry Controls, Inc.	167
E. A. Baumbach Mfg. Co.	1027
Bausch & Lomb Optical Co.	1032
Beaver Tool & Engineering Corp.	444
Beckett Harcum Co.	545

Exhibitor	Booth
Bendix Westinghouse Automotive Air Brake Co.	537
Besly Welles Corp.	637
Black & Webster	258
Edward Blake Co., Inc.	261
E. W. Bliss Company	505
Boice Mfg. Co.	932
Bokum Tool Co.	136
Boyar Schultz Corp.	1510
Bridgeport Machines	1507
Briney Mfg. Co.	159
Bristol Company	541
Walter H. Brooke Machine Tools	432
Brown & Sharpe Mfg.	374
Charles Bruning Co.	1001
Brush Electronics	1017
Bryant Gage & Spindle Division, Bryant Chucking Grinder Co.	901
Buck Mfg. Co.	1801
Buck Tool Co.	650
Buckeye Tools Corp.	113
Burg Tool Mfg. Co.	389
Cadillac Stamp Co.	212
Cammann Mfg. Co.	140
Capewell Mfg. Co.	1141
Carboloy Dept. of GE Prod. Operations	1318
Carpenter Steel Co.	1310
Carter Controls Inc.	636
Case Maul Mfg. Co.	635
A. W. Cash Company	308
Cawi Machine Co.	1901
Century Electric Co.	252
Cerro De Pasco Corp.	773
Challenge Machinery	941
Chemical Dev. Corp.	286
Chicago Dial Indicator Co.	1030
Chicago Pneumatic Tool Co.	1321
Chicago Rivet & Machine Co.	250
Chicago Tool & Engineering Co.	262
Chicago Tramrail	445
Chrysler Sales Corp., Amplex Division	253
Ciba Company, Inc.	1330
Cincinnati Milling Machine Co.	100
Cincinnati Sub Zero Products	665
Cleco Division of Reed Roller Bit Co.	688
Cleveland Cutter & Reamer Co.	758
Cleveland Grinding Machinery	1129
Cleveland Instrument Co.	920
Coffey Cummins Mfg.	733
Cogsdill Tool Prod.	185
Collins Microflat	912
Columbia Intnl. Corp.	707
Commander Mfg. Co.	800
Cooper Weymouth	208
Count O'Larm Co.	744
Arthur A. Crafts Co.	1025
Crane Packing Co.	1227
Crescent Tool & Machine Co.	144
Crodian and Co.	1222
Crucible Steel Co. of America	297
Crystal Lake Grinders	693
Cushman Chuck Co.	579

Exhibitor	Booth
Dake Corp.	1707
Danly Machine Specialties, Inc.	596
Davey Compressor Co.	1820
A. G. Davis Gage & Engineering Co.	1134
Davis Boring Tool Div., Giddings & Lewis Mach. Tool	489
Dazor Mfg. Corp.	784
Denison Engineering Multipress Sls. Div.	1706
Detroit Milling Cutter Co.	329
Detroit Power Screwdriver Co.	571
Detroit Reamer & Tool Co.	224
Detroit Stamping Co.	752
DeVlieg Microbore	421
Die-Draulic Grip	632
Eugene Dietzgen Co.	785
DoAll Company	1520
Doerr Electric Corp.	352

Exhibitor	Booth
Dow Chemical Co.	362
Drillmation Co.	737
du Mont Corp.	1106
Dumore Company	678
Durant Mfg. Co.	720
Eastman Kodak Co.	911
Eclipse Counterbore	1121
Electro Arc Sales	937
Electro Mechano Co.	1228
Elox Corp. of Mich.	574
Enco Mfg. Co.	651
Enaelberg Huller Co.	1221
Engis Equipment Co.	1020
Equipto Division, Aurora Equipment Co.	728
Ercona Corp., Scientific Inst. Div.	1013
Erickson Tool Co.	652
Esbec Barrel Finishing Corp.	768

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NO ONE LOVES A FAT GIRL
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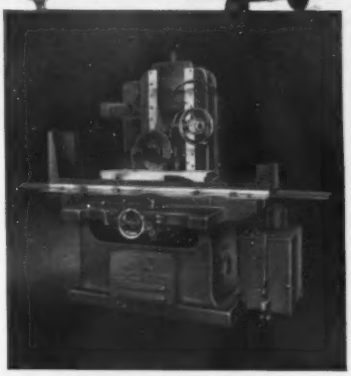
GRAND RAPIDS GRINDERS

INTERNATIONAL BUSINESS MACHINES

Producing an intricate business machine requires exceptional toolroom precision. That's why these manufacturers use Grand Rapids Grinders . . . engineered to achieve extraordinary grinding precision at cost-cutting speed.

Model No. 55, at right, offers such features as one-piece column and base for permanent, vibrationless alignment, wheel head with powered rapid vertical travel, hydraulically actuated cross feed and longitudinal travel table. And it's the fastest grinder of its size and type, with a variable table speed up to 125 fpm!

Whether you make business machines or bulldozers, you can count on Grand Rapids Grinders for maximum toolroom precision.



GALLMEYER & LIVINGSTON

GRAND RAPIDS NO. 55 HYDRAULIC FEED SURFACE GRINDER. Table speed up to 125 fpm. Working surface of table is 12" x 36". Vertical movement of wheel head is 18". Preloaded ball bearing spindle greased for life. Spindle speed 1925 and 2500 rpm.

A note on your letterhead will bring complete details.

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400 Straight Ave., S.W., Grand Rapids, Michigan

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Farrand Optical Co.	169
Fawick Corp.	367
Federal Machinery Sales Co.	392
Federal Products	496
Federal Tool & Mfg. Co.	170
Fellows Gear Shaper	544
Fenn Mfg. Company	346
Fenway Machine Co.	937
Ferguson Machine & Tool Co. Roller Gear Div.	350
Wm. H. Field Co.	302
Firth Sterling Steel, Inc., Flynn Mfg. Co.	528
Flynn Mfg. Co.	500
Fonda Gage Corp.	1011
French Expositions in U. S.	1620
Furane Plastics, Inc.	165
Gaertner Scientific Corp.	1126
Gairing Tool Co.	1519
Galland Henning Mfg.	328
Gammons Hoaglund Co.	907
Garlock Packing Co.	560
General Box Co.	1600
Gen. Industrial Diamond Co.	810
General Electric Corp.	1440
Gerotor May Corp.	750
Giant Grip Mfg. Co.	203
Giustina & C.S.P.A.	716
Govro Nelson Co.	1226
Graham Machine Tool	1612
Grand Valley Machine & Tool Co.	—
Gray Equipment Mfg.	1225
Graymills Corp.	360
Greist Mfg. Co.	1721
F. T. Griswold Mfg. Co.	236
Grobet File Co. of America, Inc.	657
Guthery Machine Tool Corp.	420
H. & H. Research Co.	402
Hammond Machinery Builders, Inc.	675
Handy & Harman	275
Hanna Engineering Works	366
Hannifin Corp.	158
Hansford Mfg. Corp.	1232
Hanson Whitney Co.	163
Harco Engineering	756
Hardinge Brothers	452
Hariq Mfg. Corp.	1718
F. Ward Harman Assoc.	1128
T. S. Harrison & Sons	415
R. G. Haskins Co.	561
Hause Engineering	246
Haynes Stellite Co., Div. Union Carbide & Carbon Corp.	931
Heinrich Tools, Inc.	788
Heintz Mfg. Co.	129
Heller Tool Company	256
Hillyer Instrument	1200
Carl Hirschmann Co.	101
Hofmann Engrg. Co.	1714
Hoglund Engineering	205
Hole Engineering Service	185
Horton Chuck	764
Howe & Fant, Inc.	575
Hudson Automatic Machine & Tool	940
C. B. Hunt & Son, Inc.	141
Huron Machine Products, Inc.	1029
Hydro Line Mfg. Co.	321
Ideal Industries	659
Illinois Metal Prod.	1712
Index Machine Co.	791
Industrial Diamond Assoc. of America	520
Industrial Filtration Co.	567
Industrial Tectonics, Inc.	1100
Ingersoll Rand Co.	345
Inspection Devices	1231
International Research & Development Corp.	1026
Iron Age	1531
Jarvis Corp.	1401
Jerkens Tool Specialty Co.	401
Jerico, J. R. Reinertson & Co.	240
Jerpbak Bayless Co.	1031
Jiffy Disintegrators, Inc.	200
Jig Bushing Co.	1101
C. E. Johansson Gage	1217
J. O. Johansson Co.	1719
Johnson Gage Co.	926
Jones & Lamson Machine Co.	497
Jones & Laughlin Steel Corp.	1606
Jones & Shipman, Ltd.	425
Kalamazoo Tank & Silo Co.	639
Karniotis Prec. Prod.	1033
Kaydon Engineering	268
Kenco Mfg. Co.	618
Kennametal, Inc.	475
Kauffel & Esser Co.	524
Kina Punch Co.	712
Koebel Diamond Tool Co.	209
Kolcast Industries	1110
Korfund Co.	1640
Kurt Orban Co., Inc.	305
Lamina Dies & Tools	562
Landis Machine Co.	578
Lapeer Mfg. Co.	553
Latrobe Steel Co.	451
Le Count Tool Works, Inc.	1107
K. O. Lee Company	187
K. P. National Sales	1717
Lees Bradner Co., Cri Dan Division	424
Lehmann Fulton Boring Tool Co., Div. Fulton Iron Works	213
Lempco Industrial	519
The Lenz Co.	1702
Lindberg Engineering Co.	1201
Linde Air Products	931
F. J. Littell Machine	589
Lodding, Inc.	735
Logan Engineering	900
Logansport Machine Co., Inc.	245

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M. B. Products, Div. of Tool Sales	557
M.B.I. Export & Import, Ltd.	563
Mac It Screw	906
Madison Mfg. Co.	1209
Magnaflux Corp.	820
Mall Tool Co.	738
Man-Au-Cycle Corp.	614
Manco Mfg. Co.	708
Marathon Die Set	1821
Martin Engineering	761
Marvel Engineering	1028
Maserati Corp.	1806
Master Chemical	1133
Master Pneumatic Tool Co.	608
Jas. H. Matthews & Co.	662
Mayline Co., Inc.	1036
McCrosky Tool Corp.	1117
Mead Specialties Co.	215
Melard Mfg. Corp.	1009
Merrill Engineering Laboratories	125
Metal Carbides Corp.	1300
Metal Cutting Tools	1143
Metal Lubricants Co.	666
Metal Removal Co.	617
Micrometrical Mfg.	774
Micro Poise Engineering & Sales Co.	642
Milford Rivet & Machine Co.	453
Miller Fluid Power	429
Model Machine Co.	739
Modern Devices	533
Modern Industrial Engineering Co.	613
Modernair Corp.	237
Mohawk Tool, Inc.	777
Monray Corporation	1033
Moore Products Co.	624
Moore Special Tool Co., Inc.	1430
Morrison Engineering Co.	332
H. E. Morse Co.	1010
Motch & Merryweather Machinery Co., Cutting Tool Mfg. Div.	1021
National Broach & Machine Co.	816
National Fluid Power Assoc.	238
Ind. Actuators & Controls Div. National Pneumatic	244
James Neill & Co., Ltd.	797
Karl A. Neise	162
Nelco Tool Co., Inc.	778
Nelson Stud Welding Div. of Gregory Ind.	628
New England Machine and Tool Co.	461
New Hermes Engraving Machine	166
New York Belting & Packing Co.	1307
Nichols Morris Corp.	351
Nicholson File Co.	157
Nilsson Gage Co., Inc.	717
Noble & Westbrook Mfg. Co.	767
C. A. Norgren Co.	325
North American Viking Drill	1101
Northwestern Tool & Engineering Co.	301
Nupla Mfg. Co., New Plastic Corp.	398
O. K. Tool Co., Inc.	633
Oakite Products, Inc.	1325
Tinius Olsen Testing Machine	566
Oil-Dyne, Inc.	1619
O'Neil Irwin Mfg. Co.	1000
Optical Gaging Products, Inc.	917
Ortman Miller Machine Co.	314
Osborn Mfg. Co.	466
Ozalid, a Div. of General Aniline & Film Corp.	1040
Panqborn Corp.	749
Patterson Machine	1812
C. F. Pease Co.	118
Pedrick Tool & Machine Co.	356
Perfex Gage & Tool	1818
Perry Equipment & Engineering Co.	1210
Petz Emery, Inc.	910
Pfauter Machine Co.	336
Pines Engineering	197
Pioneer Pump Div., Detroit Harvester	1406
Pioneer Tool Engineering, Inc.	1235
Portage Double Quick Tool Co.	669
Porter Precision Products	216
Portomag Sales, Inc.	288
Precise Products	299
Precision Detroit	1230
Precision Diamond Tool Co.	318
Precision Grinding Wheel Co., Inc.	267
Precision Tool & Mfg. Company	806
Precision Welder & Flexopress Corp.	725
Procunier Safety Clutch	1701
Production Devices	795
Production Machine	625
Producto Machine Co.	396
Punch Products Corp.	191
Putnam Tool Co.	105
R and L Tools	741
Racine Hydraulics & Machinery, Inc.	229
Rahn Granite Surface Plate Co.	928
Raybestos Manhattan, Inc.	161
Ready Tool Co.	1713
Reliant Gage & Sply.	1010
Rezolin, Inc.	388
Rice Pump & Machine	264
Richard Bros. Punch Div. Allied Products	478
J. A. Richards Co.	721
Rivett Lathe & Grinder, Inc.	324
Omer E. Robbins Co.	416
Robinson Aviation	117
Rockwell Mfg. Co., Delta Power Tool	1410
Rodgers Hydraulic	126
Ross Operating Valve Co.	696
Rotafeed Co.	1620
Roto Mation Motors	724
Rotor Tool Co.	674
H. B. Rouse & Co.	1206

"Look! It soaks up grease just like a sponge."

LAN-O-KLEEN removes 95% of all dirt and grime encountered in industry.

Easily — and safely!

LAN-O-KLEEN helps to protect the skin as it cleans. WEST — *in pioneering the development of "double action" industrial cleaners* — was the first to impregnate *beneficial amounts* of free lanolin into a corn meal type hand cleaner.

LAN-O-KLEEN is economical to use. It bulks greater than most other hand cleaners — *therefore goes farther per pound.* Too, the sturdy LAN-O-KLEEN dispenser rations just the right amount to do a quick, thorough cleansing job.

LAN-O-KLEEN is one of a group of WEST products formulated for the prevention and control of industrial dermatitis. Workers' hands are their most valuable tools. By helping to prevent dermatitis, you can help keep costs down — ***by keeping workers on the job at maximum efficiency.***

A specially trained WEST representative will gladly tell you more about LAN-O-KLEEN and the other products used in the WEST Dermatitis Control Plan. Just write or call your local WEST office.

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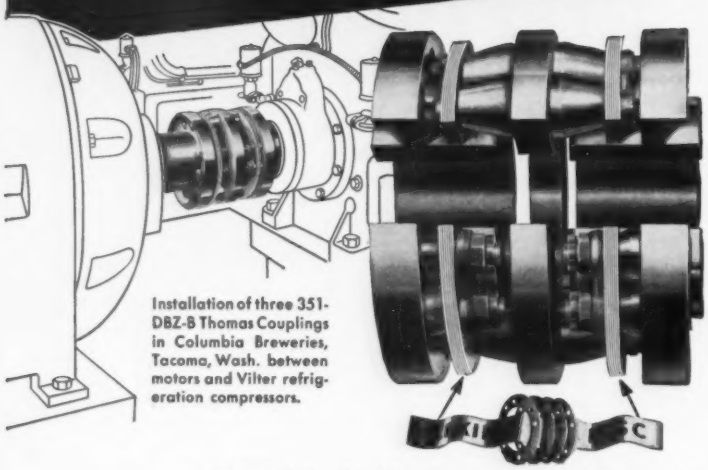
Rowe Machinery & Mfg. Co., Inc.	921
Royal Oak Tool & Machine Co.	278
Rudd Melikian Dist.	711
Russell, Holbrook & Henderson, Inc.	353
Joseph T. Ryerson & Son, Inc.	1400
S & S Machinery Co.	614
S-P Mfg. Co.	257
Sales Service Machine Tool Co.	393
Salvo Tool & Eng.	1814
Scharmann Machine	1501
Schauer Mfg. Corp.	152
Schmarje Tool & Engineering Co.	1815
Geo. T. Schmidt, Inc.	1311
A. Schraders Son Div.	575
Schramm, Inc.	600
Scott Paper Co.	228
Scully Jones & Co.	488
Seibert & Sons, Inc.	1500
Edw. Segal Machinery	1813
Selas Corp. of America	1218
Sentry Company	284
Service Diamond Tool Co.	501
Service Machine Co.	1506
Serverance Tool Industries, Inc.	289
Sheldon Machine Co.	1240
Shell Oil Co.	1306
Siewek Tool Co.	1425
Simonds Abrasive Co.	1120
Simonds Saw & Steel	1120
Simplex Machine Tool Corp.	1612
Sintax Corp.	1436
Size Control Co.	930
Skinner Chuck Co.	263
Socony Mobil Oil Co.	279
Spati Industries, Inc.	1613
Spiral Step Tool Co.	109
Spitfire Tool Co.	736
Standard Electrical Tool Co.	830
Standard Gage Co.	1016
Standard Parts Co.	1407
Standard Pressed Steel Co.	479
Star Cutter Co.	1329
Starlite Industries	300
L. S. Starrett Co.	1116
Steel Products Engineering Co.	660
The Herman Stone Co.	142
Stone Machinery Co.	755
Stupakoff Div. of Carborundum Co.	1309
Sunnen Products Co., Industrial Div.	474
Super Tool Co.	122
Superior Hone Corp.	551
Superior Pneumatic and Mfg., Inc.	1224
Superior Steel Products Corp.	338
Supreme Products	138
Swanson Tool & Machine Products	404
Swivelier Co., Inc.	503
Sykes Tool Corp., Ltd.	342
Syntron Company	631
Taylor Devices	292
Taylor Dynamometer and Machine Co.	779
Texas Company	1236
Earl A. Thompson Co.	1444
Thor Power Tools Co.	244
Thread All Sales Co.	740
Tocco Division, Ohio Crankshaft Mfg.	440
Tomco Products Co.	1213
Tomkins Johnson Co.	225
Torit Mfg. Co.	193
Torrington Co., Swaging Mach. Div.	219
Tree Tool & Die Wks.	605
True Trace Sales	760
Tubular Micrometer	724
Tubular Rivet & Stud Co.	670
Turnomat Co.	1131
Twentieth Century Mfg. Co.	241
Uddeholm Co. of America	234
Union Mfg. Co.	808
U. S. Burke Machine Tool Div.	604
U. S. Rubber Co., Mech. Goods Div.	792
U. S. Tool Co., Inc.	375
Universal Cyclops Steel Corp.	552
Univertical Foundry and Machine Co.	202
V & O Press Co.	507
Vacu-Blast Co.	1819
Valenite Metals Co.	1124
Valvair Corp.	130
Vanadium Alloys Steel Co.	1511
Van Keuren Co.	1037
Vapor Blast Mfg. Co.	718
Vascoloy Ramet Corp.	1137
Vickers, Inc.	1411
Victor Adding Mach., McCaskey Register Division	679
Vlier Engineering	1113
Vulcan Tool Co.	515
Wadell Equipment Co.	135
Waldes Kohinoor, Inc.	251
Wales Strippit Corp.	379
Walker Turner Div., Kearney & Trecker	1525
Ward-Riddle Co.	312
Warner & Swasey Research Corp.	646
Webber Gage Co.	936
Weldon Tool Co.	629
Wells Mfg. Corp.	274
Wesson Company	450
West Point Mfg. Co.	290
Westplex Corp.	1207
Wetmore Reamer Co.	1816
Wharton & Wilcocks	1705
Wheelabrator Corp.	146
Whiton Machine Co.	730
Wickman Mfg. Co.	597
Willeys Carbide Tool Company	653
Wilson Mechanical Instrument Div., Amer. Chain & Cable	909
Wilton Tool Mfg. Co.	1208
Wisconsin Drill Head Co.	502
N. A. Woodworth Co.	412
Zagar Tool, Inc.	179

THOMAS FLEXIBLE COUPLINGS...
for more years of better service!

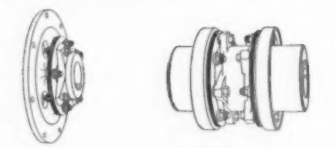


Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

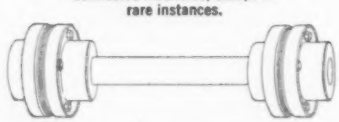
Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.



THOMAS

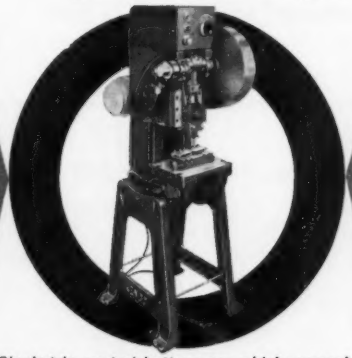
Write for our new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING COMPANY

Largest Exclusive Coupling Manufacturer in the World

WARREN, PENNSYLVANIA, U.S.A.

KENCO *15-ton*
ELECTRO-SAFE
– the safest
punch press
you can buy!



Single-trip control buttons are widely spaced, to keep hands clear of the danger zone. Operator must push **both** buttons at once... hold them until stroke reaches bottom, then release both buttons to start new cycle. Fail-safe operation. Impossible to "fudge." Impossible for press to double trip.

VERSATILE CONTROLS—You can change from "single trip" to "continuous stroke," or "inching" by merely turning a dial. You can change timing in seconds. No flywheel... no clutching. Write for details.

KENCO MANUFACTURING CO.
Mfrs. of Precision Machinery and Accessories
5211 Telegraph Road, Los Angeles 22, California

FOR SALE

ONE NEW G. E. 3 ZONE CONVEYOR HARDENING FURNACE

440 VOLTS—3 PHASE 60 CYCLES. COMPLETE EXCEPT FOR QUENCH TANK AND QUENCH CONVEYOR. INCLUDES SHAKER LOADER AND LEEDS AND NORTHRUP INSTRUMENTATION AND 1000 C.F.H. ENDOTHERMIC ATMOSPHERE GENERATOR. FURNACE RATED 800 LBS. OF STEEL PER HOUR AT 1500°F.

THE INTERNATIONAL SILVER CO.
MERIDEN, CONN.

FOR THE UNUSUAL IN
Seamless Steel Tubing...
1½" OD and smaller!
ELLWOOD IVINS STEEL TUBE WORKS INC.
700 VALLEY ROAD, PHILA. 26, PA.
ELLWOOD IVINS
WRITE . . . PHONE . . . WIRE!

$18.50
List Price*

*$18.50 is the list price for the ¼" port size and $19.50 for the ⅜" less usual quantity discounts.

250 P.S.I.
4-WAY VALVES
for Air and Cost-Minded
TOOLING and PRODUCTION MEN

Important Savings	Low initial cost. Need no oilers and filters (time and materials savings).	All components are corrosion resistant.
Low Maintenance	Sealing qualities do not diminish with long, continued use.	Wear compensating "Shear-Seal" design.
Long Service Life	No production delays. Maintenance (rarely needed), without disturbing plumbing.	Lapped metal to metal sealing members.
Not Critical to Dirt	No scoring or binding. (As with spool or poppet designs.)	Flow is through "Shear-Seals." Sealing surfaces remain in constant intimate contact.
No Creeping Cylinders	Leakproof closure. (No internal port to port leakage.)	Maintained through lapping action of each operation.

Ask for bulletin A-5.

Foot operated models with or without spring return to reverse or to center are $24.50 list for the ¼" and $25.50 for the ⅜" valve less quantity discounts.

BARKSDALE VALVES
5125 Alcoa Avenue, Los Angeles 58, California

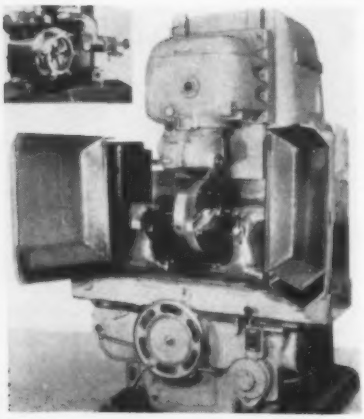
NEW EQUIPMENT

New and improved production ideas, equipment, services and methods described here offer production economies . . . for more data use the free postcard on page 189 or 190.

Four station unit handles 240 parts per hr

Machining operations including turn OD, face rim, and chamfer on a cast iron workpiece are performed at the rate of 240 parts per hr by this four station, continuous production machine. The special purpose unit has a steel weldment base designed for maximum floor space economy. Four hydraulically powered slide units are mounted on scraped base pads, each slide unit carrying two boringheads and a single motor drive arrangement. Hydraulic pressure is supplied to the slides by a 30 gpm hydraulic power unit mounted at rear of machine. *Heald Machine Co.*

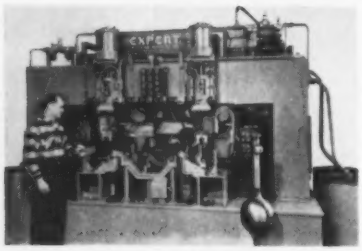
For more data circle No. 30 on postcard, p. 189



Gear shaver finishes gears to 24 in. pitch diam

An improved gear shaving machine for finishing external and internal spur and helical gears up to 24 in. pitch diameter is equipped with loading rails that enable external gears to be easily loaded in and out of the machine under the shaving cutter which is above the work. (See photo.) When internal gears are shaved (inset photo) on the machine, swivel work head and internal cutter head attachments are provided. A hollow spindle in the work head permits the shaving of parts with integral shafts. The swivel work head enables the work to be swung out towards the operator for easy loading and unloading. Cutter on the internal cutter head is brought into mesh with the work gear and locked in one motion. Work gear drives the cutter when shaving internal gears. When shaving external gears, cutter drives work on machine. Handles gears to 28⅞ in. between centers. *National Broach & Machine Co.*

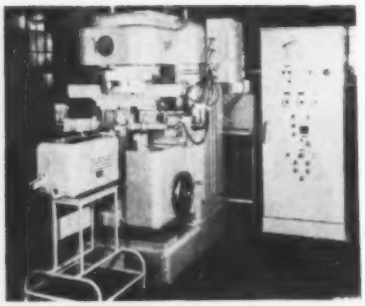
For more data circle No. 31 on postcard, p. 189



Combines projection and shielded arc-welding

An automatic welding machine utilizes automation concepts to combine projection and carbon dioxide-arc welding in the assembly of two stamped spring support brackets to an automotive rear axle housing. The unit, which is said to produce 130 welded assemblies per hr at 80 pct efficiency, is an in-line transfer type machine in which the parts are automatically transferred from station-to-station with a mechanism powered by an air motor. Machine is about 8 ft high. *Expert Welding Machine Co.*

For more data circle No. 32 on postcard, p. 189

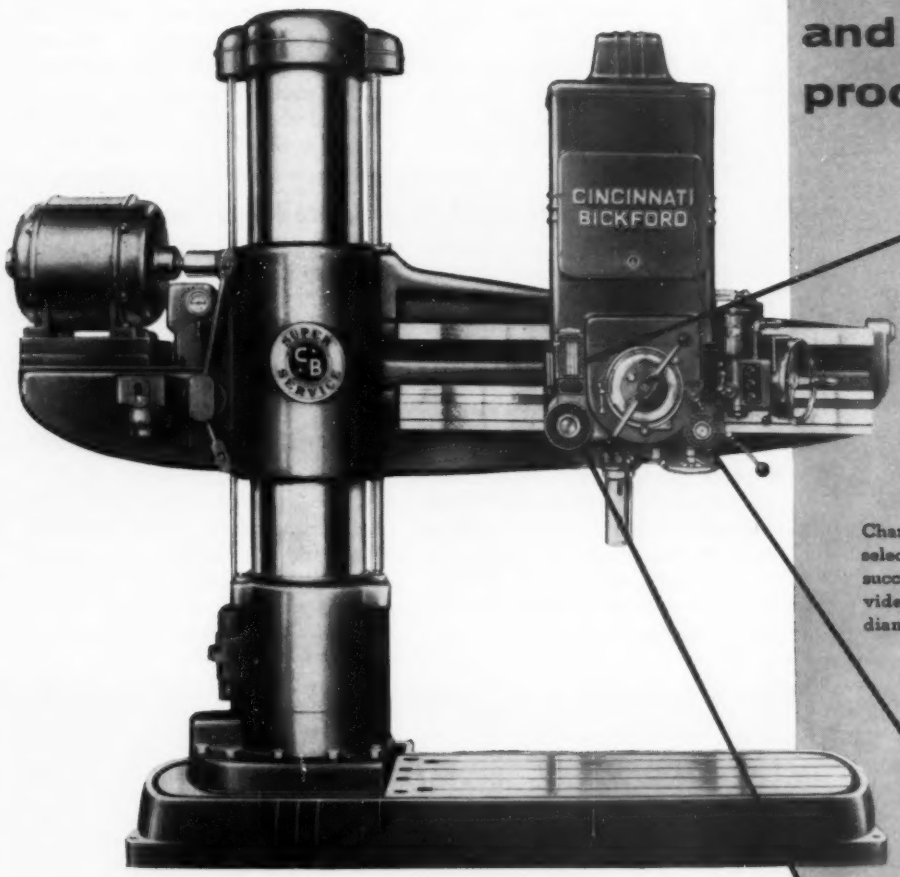


Underpass gear finisher shaves 260 units per hr

This underpass gear shaving machine is described as finishing gears automatically in an automotive plant at the rate of 260 units per hr. The entire line consists of the shaver with a vibrating hopper feed, automatic loading, a 3-way probe-type gear classifier and a control panel. In addition to controlling operation of the machine, the control panel counts correct size gears and keeps track of oversize or undersize gears on both a percentage of production and total count basis. A feedback system actuated by the gear classifier corrects center distance when gears come undersize or oversize. *Michigan Tool Co.*

For more data circle No. 33 on postcard, p. 189

HEAD WORK... saves time ...controls and speeds production!



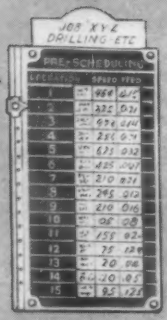
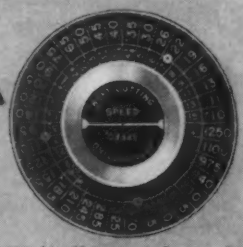


Chart guides the operator in pre-selecting speeds and feeds for succeeding operations. It provides a permanent record of tool diameter, speed and feed.

Hydraulically pre-selects all 18 feeds. Positive geared tap leads and feeds are quickly pre-set.



Hydraulically pre-selects all 36 speeds. Speeds and tool diameters are shown in large easy to read figures.

This NEW modern head gives an accelerated production and an increase in accuracy of performance ... the greatest advance in simple and positive control in Radial Drill history.

Two convenient direct reading dials control the automatic shifting of sliding gears. While the tool is cutting, merely set the dials to the speed and feed for the next operation. As the spindle is stopping for inserting the next tool, the shifting is done hydraulically ... directly, quietly and quickly. No other operations—no loss of time. Write for catalogs.

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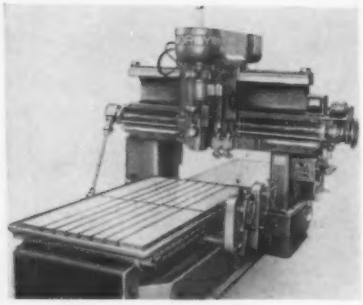
Cincinnati 9, Ohio, U.S.A.

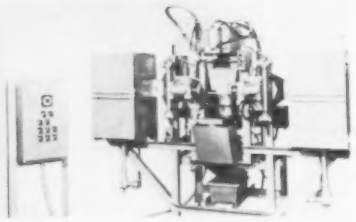
GIDDINGS & LEWIS MACHINE TOOL CO. : Fond Du Lac, Wisconsin.



Profile-Miller for ferrous and non-ferrous metals

A newly designed Profile-Miller has a table 48 in. x 120 in.; a width between columns of 60 in.; and a distance between table and spindle of 21 in. The spindle is driven by a 40 hp motor with provision for 18 speeds from 44 to 4800 rpm. It is available with tables from 48 in. x 48 in., in increments of 2 ft, up to 144 in. Additional widths and lengths are available to suit individual requirements. The machine is equipped for hand profiling of ferrous and nonferrous metals. Unit shown is equipped with power feed to table and variable feeds from 0 to 160 in. per min. Other power feeds are available. *Morey Machinery Co., Inc.*

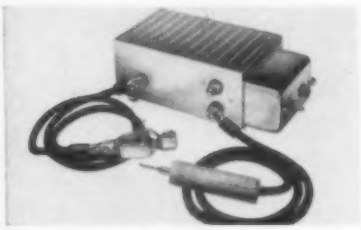
For more data circle No. 34 on postcard, p. 189



Machine developed to produce larger hollow cores

A machine which will handle core boxes measuring up to 20 in. x 16 in. x 10 in. is available. Described as developed to meet demand for a machine capable of producing larger hollow cores, the unit is a two-station machine that requires one operator. It is reported to make finished cores in a 45-second cycle without the use of separate driers or ovens. Both semiautomatic-electric and manual models are offered. *Spo, Inc.*

For more data circle No. 35 on postcard, p. 189

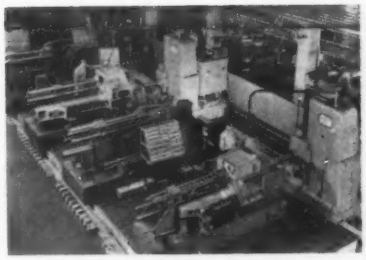


Ferrous metal marker comes with six marking heats

Designed to etch and mark stainless steel, steel alloys or carbides and other ferrous metal materials with the ease and legibility of a pencil, a new combination Etchtool and Demagnetizer offers six distinct marking heats. The unit demagnetizes simultaneously while it etches, by means of a 4 in. wide demagnetizing surface. With a cast aluminum housing and weight of 17 lb, it is portable. *Luma Electric Equipment Co.*

For more data circle No. 36 on postcard, p. 189

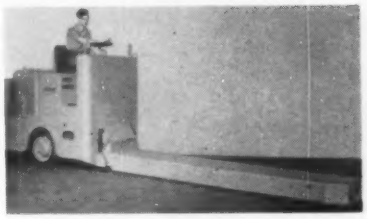
Boring mill reduces machining set-up time



A saving of 50 to 60 hours of fixture set-up time per month in the machining of turret lathe bed castings at one plant is attributed to a new twin-column, floor-type, horizontal boring mill. The machine utilizes permanently located fixtures at four work stations and traveling spindle columns. This innovation, the maker reports, enables the operator to take the machine spindle to the work, rather than vice versa. All motions are under push button control of the operator. *Warner & Swasey Co.*

For more data circle No. 37 on postcard, p. 189

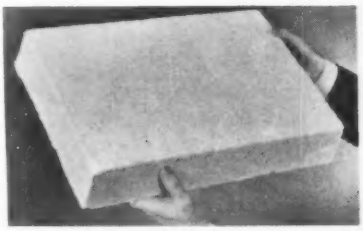
Sit-down type low lift platform truck developed



Designed to offer the first sit-down type electric powered low lift platform truck, this new unit permits driver to sit rather than stand during operations. Advantages: reduced operator fatigue; better operator vision; clearer view forward on use with large, bulky loads. Available in capacities from 10,000 to 20,000 lb., the truck may be battery, gas-electric or diesel-electric powered. *Elwell-Parker Electric Co.*

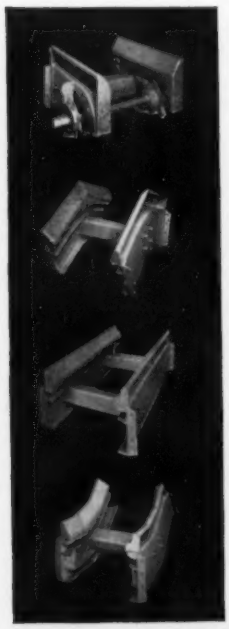
For more data circle No. 38 on postcard, p. 189

Ceramic block will temperature insulate to 2300°



Described as resistant to temperatures to 2300°F. and chemically inert, a new high heat resistant, lightweight, bonded ceramic fiber block has been developed. In use as mentioned above it reportedly withstands flame impingement and is unaffected by furnace atmospheres. It has an approx. density of 20 lb per cu ft; thermal conductivity of 1.27 BTU/hr., sq ft and °F/in. of thickness at mean temperature of 1000°F. *The Carborundum Co.*

For more data circle No. 39 on postcard, p. 189



Now you can buy CUSTOMIZED conveyors in pre-fabricated STANDARD sections

In a single glance, you can see all of the advantages of MAY-FRAN STANDARDIZED components.

The five standard sections shown can be assembled to form virtually any type of *"customized"* conveyor for the handling of stampings, formed metal parts, forgings, automotive scrap, chips and turnings.

Straight sections . . . concave or convex sections . . . take-up charge and discharge-end sections can be furnished to meet specific requirements of belt width as well as load bearing and volume capacities.

A single glance at the MAY-FRAN conveyor standardization program, and you will see savings never before possible. In addition you will see unsurpassed conveyor flexibility.

MAY-FRAN . . . a name long recognized in the materials handling field . . . is **FIRST** again with *standardized* components for your *customized* installation.

Write today for complete information.

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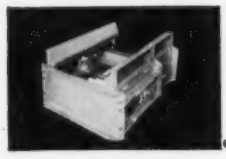

6030-MF

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What Can A REVOLVING Trolley Crane Do For You?

This EUCLID CRANE

with a full revolving trolley solved the unusual problem with which a manufacturer was confronted.

Billets are picked up at the furnace and turned at right angles as the crane travels along the runway.

Manual manipulation of the load at its destination is avoided and the sequence of operations continues without interruption. Overall production is speeded and costs lowered.

Since this specially designed Euclid trolley is capable of revolving 360° it is adaptable to numerous other time saving operations.

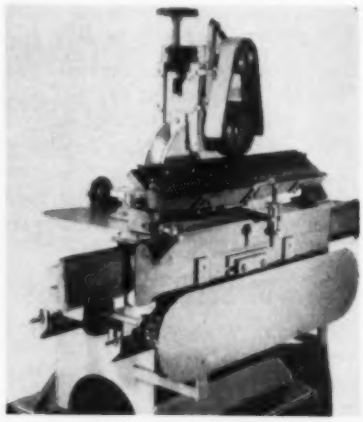
Euclid standard cranes and hoists meet a majority of requirements. If your needs are unusual, however, Euclid engineers will design special equipment to handle the situation.

Write for Literature

THE EUCLID CRANE & HOIST COMPANY
1361 CHARDON ROAD, CLEVELAND 17, OHIO

Belt knife grinder

A new knife grinder, utilizing the coated abrasive cloth belt method, is recommended for planer, chipper and hog knife grinding. One of its advantages is described as full sharpening visibility for the operator. Reported faster cutting action of the new machine is provid-



ed through use of the wheel grooves milled into the cutting face of the contact wheel. This design is said to prolong belt life while the cog-tooth design produces a cooling action. Grinders use 36, 38 or 40 in. grinding belts. *Andrus Mfg. Co.*

For more data circle No. 40 on postcard, p. 189

Belt conveyors

Pre-built sectional belt conveyors in standardized, pre - engineered units in capacities ranging up to 1500 ton per hr are now available. They are offered in 18, 24, 30 and 36 in. belt widths with 24 and 42 in. deep trusses, and using drives

ranging up to 40 hp. Built in the company plant nearest jobsite and shop-assembled for easy installation, they are recommended for mining and quarrying, steel mills and foundries. *Link-Belt Co.*

For more data circle No. 41 on postcard, p. 189

High speed drills

Production of a series of high speed, straight shank, short length drills that are especially designed for use in screw machine drilling operations has been announced. Reportedly engineered with correctly proportioned web thickness, flute contour and spiral, the drills are

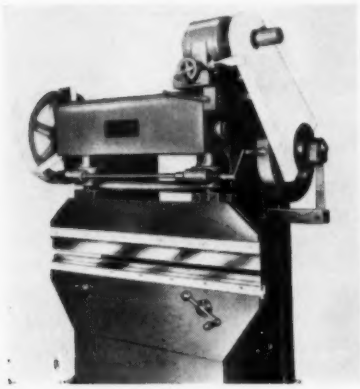
said to provide ease of penetration, efficient chip removal and long life between resharpenings. The drills are available in fractional, wire gage and letter sizes in both right and left hand styles. *Whitman & Barnes.*

For more data circle No. 42 on postcard, p. 189

Press brake

Features on a new model press brake of 24 ton capacity are described as including all steel gearing, front-operated variable speed drive, one horsepower motor and front-operated back gage. The unit is described as bending 4 ft of 12 gage mild steel over a 7/8 in. die. Built for continuous, trouble-free production, the unit's bed and ram are 48 in. long and the distance between side frames is 32 in. *W. Whitney Stueck, Inc.*

For more data circle No. 43 on postcard, p. 189



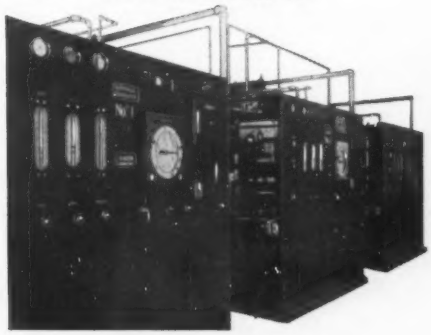
For Fully Automatic, High Purity, Safe, Economical

Furnace Brazing and Bright Annealing of Stainless Steel

Nitroneal Gas Generator

- NO OPERATING PERSONNEL REQUIRED
- COMPLETELY OXYGEN-FREE
- NO EXPLOSION HAZARD
- 30% CHEAPER THAN DISSOCIATED AMMONIA

Write for FREE, informative booklet No. 21 and technical assistance.



Pure nitrogen with controllable hydrogen content that can be varied to meet changing requirements and maintained between .25% and 25% is provided, at low cost, by the Nitroneal Gas Generator for use as material or for processing. Applications include: bright annealing, heat treating and furnace brazing of stainless steel, low and high carbon steels and non-ferrous metals.

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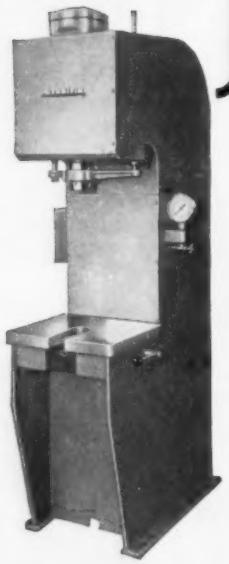
ESTABLISHED 1869
diamond... it stands for
QUALITY
BRASS
BRONZE
NICKEL SILVER
Sheet, Strip, Mill Coils or Cut to Length
THE PLUME & ATWOOD MANUFACTURING COMPANY
Thomaston, Conn.

PRICE LIST
ON HANNIFIN STOCK
HYDRAULIC PRESSES



1-TON	$ 552
2-TON	$ 627
5-TON	$1,286
8-TON	$1,581
10-TON	$1,855
25-TON	$3,681

Prices complete with motors and starters F.O.B. our press plant, St. Marys, Ohio, subject to change without notice.

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Demand for these popular presses is so consistent we are able to produce them in quantity and pass the savings along to you.

Construction-wise and quality-wise these small general-purpose presses are identical to the larger Hannifin presses, up to 150 tons. Special, optional controls when needed.

WRITE for complete information on the Hannifin Hydraulic Press you're interested in.

HANNIFIN
HANNIFIN CORPORATION, 513 S. WOLF ROAD, DES PLAINES, ILLINOIS

Spot welder

An air-operated, fully automatic spot welder is now available which welds two pieces of ⅛ in. steel. The unit is reported to weld 18 gage steel 100 spots a minute, lighter gages as fast as the operator can supply them to the unit.

Featuring a transoidal transformer with a power factor of 70 pct, the unit is fully automatic. *Brennen, Bucci and Weber, Inc.*

For more data circle No. 44 on postcard, p. 189

Convection ovens

A series of horizontal airflow mechanical convection ovens with a temperature range to 1200°F, automatically provide a constant air weight circulation at all temperatures to give greater heating efficiency. The key to this is designated as an automatic control damper which progressively and

automatically permits more air into the working chamber as the temperature rises. The ovens are manufactured in three standard sizes. *Blue M Electric Co.*

For more data circle No. 45 on postcard, p. 189

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Drop Forgings

Made to your blueprints in many metals, in weights from ¼ to 15 pounds, depending on design. Accurate, smooth, and flash free. Their dense fibrous structure and controlled grain flow gives tremendous strength. Machined if desired.

Upset Forgings

In a great variety of metals and alloys. High strength parts accurately produced —no flash, no blowholes. Excellent machining qualities.

Special Fasteners

Made to your specifications in any metal or alloy, ferrous or non-ferrous, ground or unground. Bolts to 2" diam., studs to 2½" diam. Fully dependable. Cut or precision rolled threads.

Whatever your requirements in drop forgings, upset forgings, or special fasteners, send your specifications and blueprints to RITCO for estimates.

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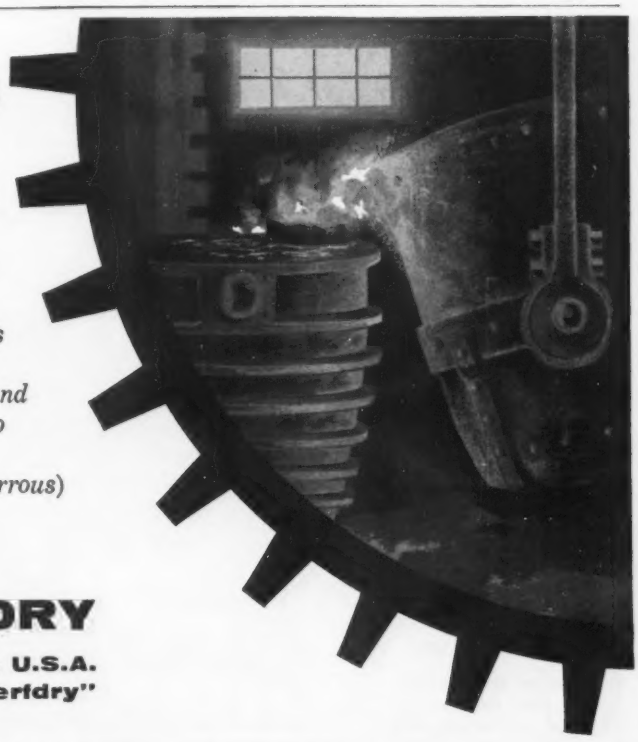

Service Foundry is one of the few foundries in the southland with facilities for large capacity work in both their foundry and machine shop. "SERVICE" is prepared to meet your most exacting requirements on castings of all types (iron, steel and non-ferrous) . . . on gear cutting and machine work.

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And . . . when it comes to speedy performance . . . over 100 presses, from 40 to 1000 tons capacity, offer diversified facilities at WSM for shaping all workable metals into light, heavy and deep drawn stampings.

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Let us put this knowledge to work for you . . . a WSM representative will be glad to discuss your stamping problems without obligation.

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Ton Capacities
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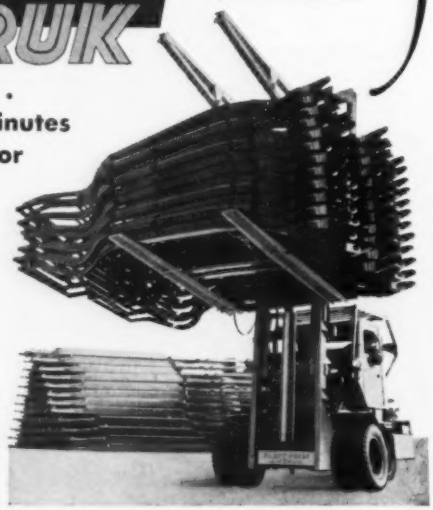
"72 frames per load . . . three lifts every four minutes . . . proves our needs for additional LIFTRUKS"

The SILENT HOIST Heavy-Duty Fork LIFTRUK so rapidly stepped up the production and movement of material, over past handling methods, that this Plant Manager (quoted above), was equally quick to anticipate *fleet* LIFTRUK operations in their plant. *Another example that LIFTRUK pays its way!*

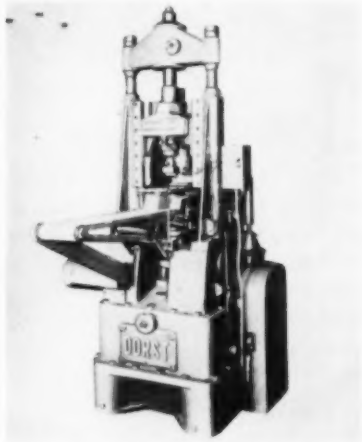
Can we aid in solving your problems? Send for Bulletin #77.



SILENT HOIST & CRANE CO.
Pioneer Mfrs. of Heavy Duty Materials-Handling Equipment
851 63rd Street, Brooklyn 20, N. Y.

Powdered metal presses

A new 110 ton automatic powdered metal press is capable of producing 4 to 20 pieces per minute depending on the intricacy of the part. The unit is said to incorporate such features as: time saving adjustment controls with micrometers for the pre-press movements;



automatic fill, press and ejection of the material; variable speed drive capacity up to 20 strokes per minute; and pick up mechanism and conveyor belt to remove pressed parts automatically. *Arnhold Ceramics, Inc.*

For more data circle No. 46 on postcard, p. 189

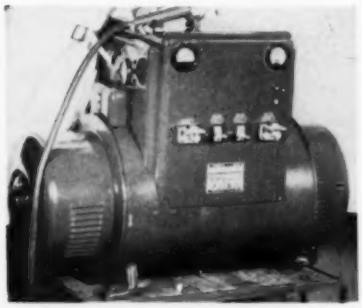
Electric impact wrench

A ½ in. square-drive universal electric impact wrench is designed for fast nut-setting and removal. It is also recommended for drilling in steel, wood, stone or other materials; as a screwdriver; and for tapping, driving or removing studs. The wrench is 9⅝ in. long overall, weighs 7 lb and has a 1-7/16 in. offset. Delivers 1900 blows per min. *Thor Power Tool Co.*

For more data circle No. 47 on postcard, p. 189

Power unit

For use as a power source in the carbon arc-compressed air method of cutting and gouging all kinds of metals, a machine is rated at 1000 amp, on 85 pct duty cycle; or 900 amp, on 100 pct duty cycle, at 36 to 54 v. Main current ranges are provided by four bus type cable terminals—one negative and three positive. The cutting torch cable is attached to low, medium or high



current to suit the job. A hand wheel on the side of control cabinet is used to adjust arc voltage. A toggle switch makes possible the use of a soft start arc if desired. The unit is designed for use on power of 2 or 3 phase, 60 cycles, 220/444 v. (dual) or 550 v. (single. *Hobart Brothers Co.*

For more data circle No. 48 on postcard, p. 189

Relief valves

An ⅛ in. pipe size relief valve, added to a company line, is available in brass or steel for pressures from 50 to 1000 psi. These valves —also available in ¼, ⅜, ½, ¾ and 1 in. sizes—are designed so that the relief pressure, which is adjustable internally, is tamperproof when the valve is installed. The ⅛ in. unit is suitable for use with test bench equipment to prevent over pressurization on equipment, small pumps, and gages; for use with block valves to provide thermal relief; and for use in place of frangible disks on high pressure containers to provide thermal relief and relief from over pressurization. *James-Pond-Clark.*

For more data circle No. 49 on postcard, p. 189

Looking For

LOW COST

Stainless Steel?

. . . then you want

MicroRold® 430 Sheet

MicroRold Type 430 is a straight chromium-stainless with a nominal composition of 17% chromium. Though it is less resistant to corrosion, it retains all of the other desirable qualities of stainless and has proven very satisfactory in a wide range of mild corrosion applications.

MicroRold 430 is the least expensive of all stainless types because it does not contain nickel. This results in a 7¾c per pound difference in base price between Type 430 and Type 302, the most popular higher grade stainless. A saving of $155 per ton is possible and is of merit to cost-conscious fabricators.

MicroRold Type 430 sheets are available in thicknesses .005" to .109" with 2B or 2D finishes; and in thicknesses .010" to .109" in No. 3, 4 and 7 finishes.

Send for your copy, "Care and Use of 430 Stainless".

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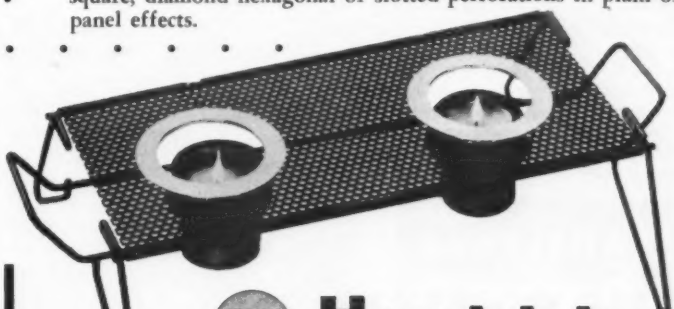
Something new has been added to the "Coffee Klatch"

The Silex Company, noted manufacturers of vacuum coffeemakers, selected Hendrick Perforated Metal to fabricate this popular two-unit coffee-casserole warmer. Hendrick Perforated Metal not only adds to a product's attractiveness but it increases its saleability as well. You can select from hundreds of attractive designs in commercially rolled metals and gauges to suit your most exacting requirements. Available with round, square, diamond hexagonal or slotted perforations in plain or panel effects.



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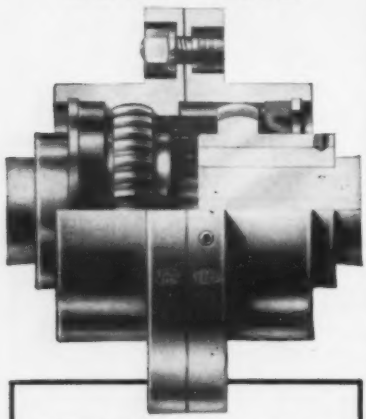
Perforated Metal • Perforated Metal Screens • Wedge-Slot and Hendrick Wedge Wire Screens • Architectural Grilles • Mitco Open Steel Flooring • Shur-Site Treads • Armorgrids • Hendrick Hydro-Dehazer

Here's the Big DIFFERENCE
TEETH ARE CUT

ON A TRUE ARC

SPHEREFLEX®
COUPLING

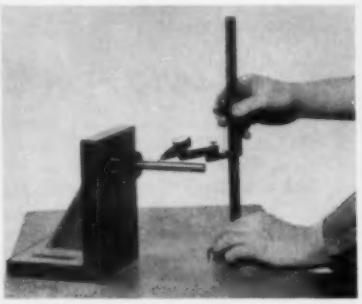


SPHEREFLEX tooth design features an exclusive curved root and spherical tooth flank. Both angular and linear (parallel) misalignment are compensated for, since every portion of each gear tooth is actually a segment of a sphere. This special design eliminates all possibility of tooth interference and permits increased deflection between mating members. Full and uniform line contact, through the working depth of the tooth, insures a stronger coupling between driver and driven shafts; eliminates point rolling contact between gears during flexing; compensates for shaft misalignment up to 14° included angle. Send for Catalog C-560.

PHILADELPHIA GEAR WORKS
INCORPORATED
ERIE AVE. AND G ST., PHILADELPHIA 34, PA.
NEW YORK • PITTSBURGH • CHICAGO • HOUSTON • LYNCHBURG, VA.
BALTIMORE • CLEVELAND
Virginia Gear & Machine Corp., Lynchburg, Va.
Industrial Gears & Speed Reducers • Limitorque Valve Controls
Established 1892

Precision checker

The angle of deviation from true horizontal or vertical is reported to be quickly proved on most movable or mounted fixtures by means of a new precision checking device called the Magnacheck. The instrument is said to assure more positive inspection of angle plates, angle bars,

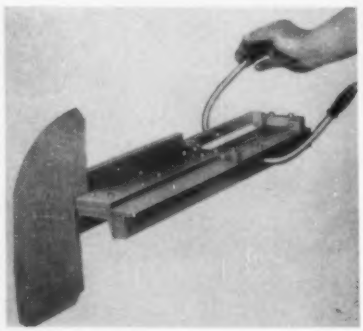


dies and tools. Inspection and checking can be done in any position, including horizontal. Magnacheck is manufactured from stainless steel and has a powerful permanent type magnetic base, eliminating the necessity for clamping it in position. *Magna-Lock, Inc.*

For more data circle No. 50 on postcard, p. 189

Cheek bender

A new cheek bender is designed to eliminate hand labor and speed up the production of elbows and other fittings. It's a device said to accomplish mechanically and perfectly those inside corner bends that have previously been done by hand. The machine has a 12 in.



throat and accommodates up to 20 gage metal. Changeable strips make the unit adjustable for varying widths. *Bett-Marr Mfg. Co.*

For more data circle No. 51 on postcard, p. 189

WARD STEEL CO.

PROMPT WAREHOUSE SERVICE ONLY
Most Complete Stock in America of
BLUE TEMPERED SPRING STEEL
We believe that the way to sell is to carry a stock which permits satisfying any reasonable warehouse demand.

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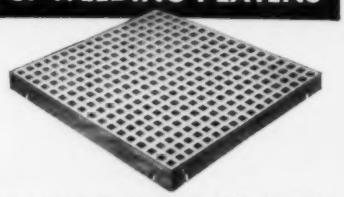
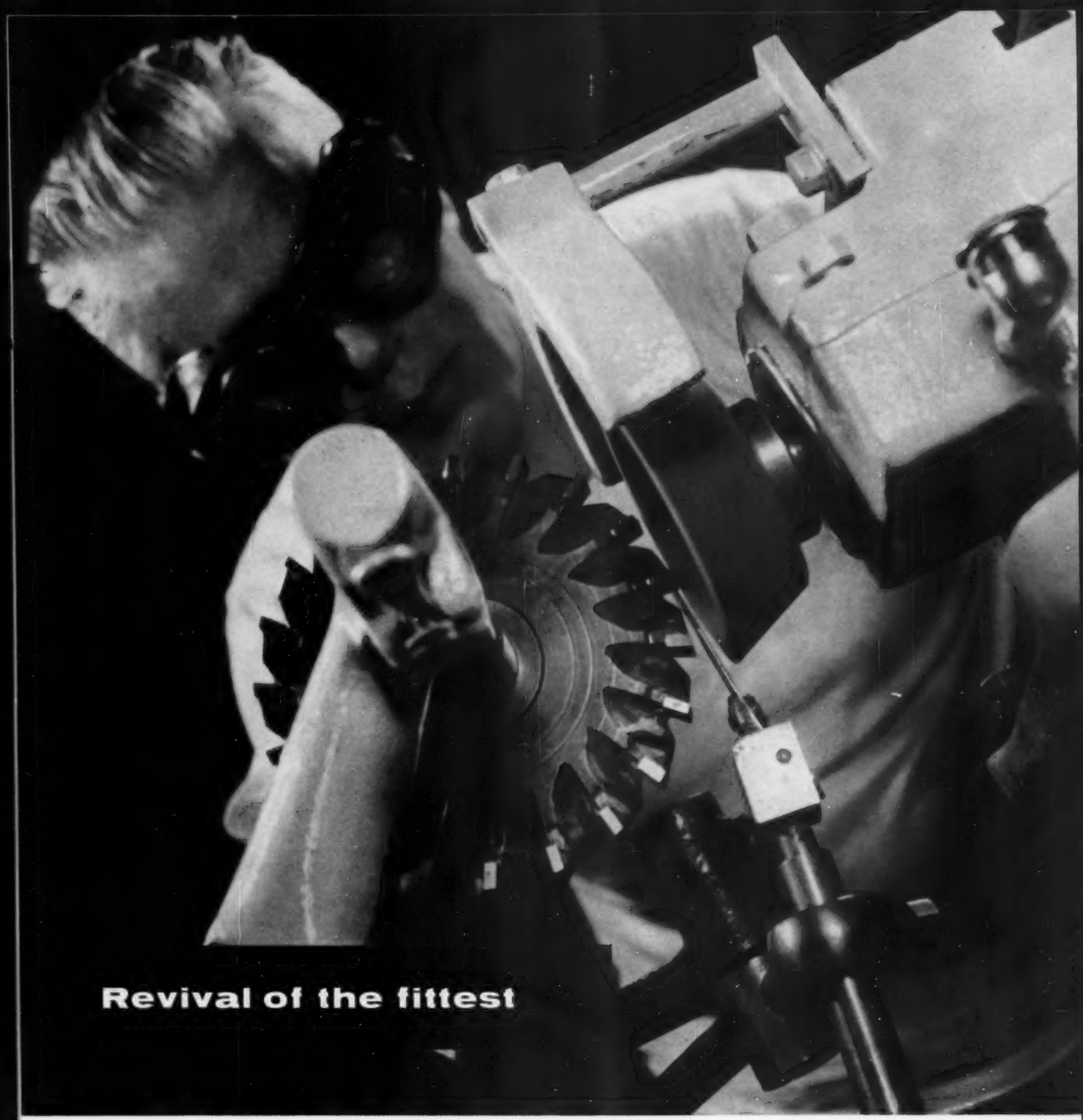
BENDING BLOCKS or WELDING PLATENS



4 ft x 4 ft—5 ft x 5 ft—5 ft x 6 ft. Also other sizes. Cast steel blocks for layout, welding & assembly. Tools, stands & accessories. Write today for information.

ACORN IRON & SUPPLY CO.
Delaware Ave. & Poplar St., Philadelphia 23, Pa.

Like to speed up your reading?
Turn to pages 2 and 3 of The Iron Age every week and let the
Digest of the Week in Metalworking
help you find your favorite features.
IT PAYS TO READ IRON AGE ADS TOO!



Your best first step in giving dull cemented carbide tools a new lease on life is to select a "Green-Grit" silicon carbide wheel by CARBORUNDUM. For milling cutters and other multiple-point tools, where finer finishes are required, "Green-Grit" resinoid bond wheels offer superior form-holding ability. Even with heavier infeeds, they cut free and cool. In roughing operations, where stock removal is more important than finish, you'll find "Green-Grit" vitrified bond wheels your best bet. They permit both steel and carbide to be ground together—with outstanding results.

Your CARBORUNDUM Distributor or salesman can help you choose the right "Green-Grit" wheel for every job. Call him today. For Booklet A-1208 on carbide grinding, write The Carborundum Co., Niagara Falls, N. Y. In Canada: Canadian Carborundum Co., Ltd., Niagara Falls, Ont.

Through application "know-how" and product quality

CARBORUNDUM

REGISTERED TRADE MARK

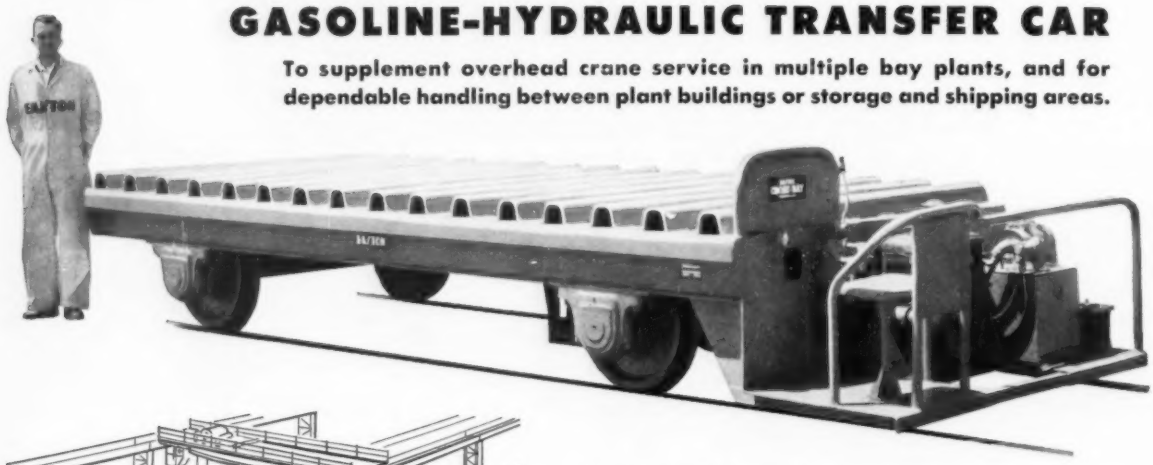
continually puts more sense in your abrasive dollar

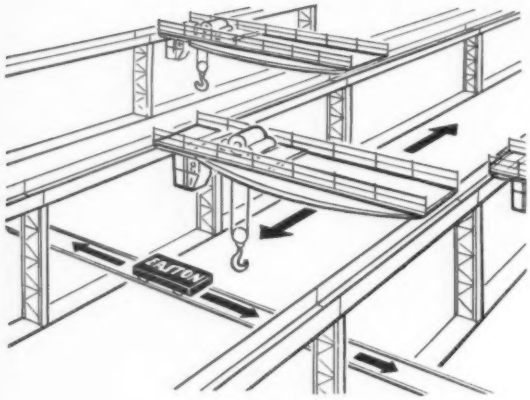
684 PRINTED IN U.S.A.

NEW CROSS-BAY®

GASOLINE-HYDRAULIC TRANSFER CAR

To supplement overhead crane service in multiple bay plants, and for dependable handling between plant buildings or storage and shipping areas.

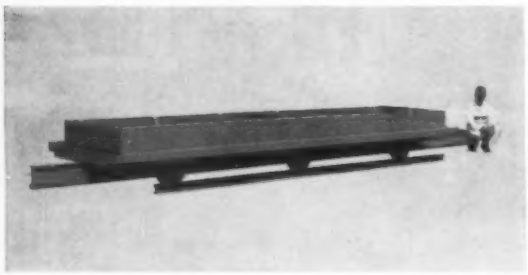




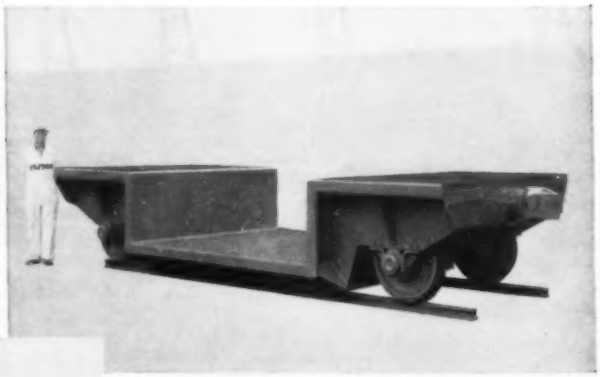
EASTON CROSS-BAY CARS are custom-built to meet speed and capacity requirements. Special superstructures can be designed for specialized or mechanized handling. The gasoline-hydraulic Cross-Bay Car illustrated above was built for steel warehouse work. It provides a capacity of 25 tons plus 50% for impact loading, and a two-way speed of 50 feet per minute.

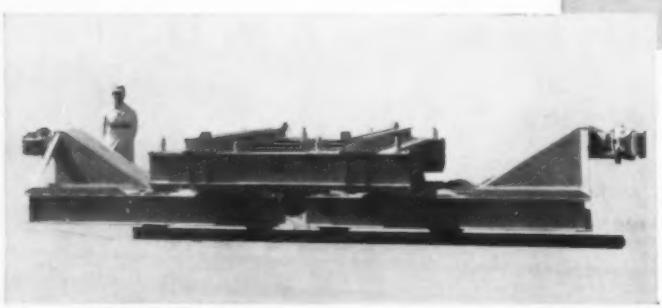
In addition to the gasoline-hydraulic car shown above Easton Cross-Bay Cars may be powered by electric motor, electro-fluid drive, gasoline-electric drive or storage battery. Capacities from 5 to 500 tons. Controls may be manual, electric (by push-button on the car or remote station) or electronic.

SEE EASTON FIRST FOR CUSTOM-BUILT CARS FOR INDUSTRY



Annealing Furnace Car Equipped with Rack Beam ▲





▲ Split-level Platform Car—Capacity 50 tons

◀ Double-truck Transformer Transfer Car —Capacity 150 tons

A-1049

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EASTON CAR & CONSTRUCTION COMPANY • EASTON, PA.

The Iron Age SUMMARY . . .

Steel labor is loaded for bear . . . Demands will be high but chances are 50-50 for peaceful settlement . . . Steel market continues strong . . . Autos brighter.

Labor Angle . . . Steel labor will shoot for the moon in this year's negotiations with steel producers. It will settle for something less. But if last year's strategy is any criterion, the outcome will be in doubt up to the last minute.

Chances are 50-50 for a peaceful settlement. Dave McDonald of the steel union is decrying talk of a possible strike. Steel managements also are playing down such speculation.

But there's no doubt that the United Steel Workers are loaded for bear this year. Some sources claim their asking price will be a near-40¢-per-hour package. There will also be such sticky issues as supplementary unemployment benefits and the full union shop. There could be serious trouble over one or both.

Union Strategy . . . Mr. McDonald's ideas on a rock-bottom settlement may not be known until the eleventh hour. He used this strategy with success last year, forcing a short-lived but costly strike. The walkout cost thousands of tons of ingot production because of pre-strike shutdown preparations and post-strike return to normal.

The steel union leader still has some insurgent groups within his own organization to contend with and he'll not be inclined to take anything less than a "substantial" settlement. This might be in the neighborhood of 17-18¢ per hour. For steel consumers, the offsetting price increase may be about $8 to $9 per ton.

Steel labor talks will come at a time when steel consumers are still jockeying for position on mill order books. There has been no real let-up in steel demand, which continues to exceed ability to produce. Consumer inventories are far from comfortable. Attempts at a buildup have been stymied by universal demand from virtually all industry.

Auto Outlook . . . The automotive sales picture is looking a lot better. And some automotive purchasing agents now wish they had not been so quick on the trigger about cancellations. One large auto company is busy denying reports that it is selling off any of its steel inventory.

Also, the talk about auto companies planning to unveil their 1957 models earlier than usual this year is quieting down. Optimistic reports from the sales front bear this out. But there are other reasons: (1) The die program of one body maker is bogging down for lack of heavy gage plate, and (2) shortage of steel structurals is holding up expansion plans of another auto firm.

Steel Output, Operating Rates

Production (Net tons, 000 omitted)	This Week 2,449	Last Week 2,462	Month Ago 2,398	Year Ago 2,232
Ingot Index (1947-1949=100)	152.2	153.0	149.1	138.7
Operating Rates				
Chicago	98.5	98.5	98.5	97.0
Pittsburgh	102.0	103.0*	98.0	94.0
Philadelphia	104.0	103.0	103.0	91.0
Valley	97.0	97.0	96.0	92.0
West	97.0	98.0*	97.5	92.5
Detroit	102.0	93.0*	95.0	90.0
Buffalo	105.0	105.0	105.0	100.0
Cleveland	106.0	105.5*	98.5	97.0
Birmingham	96.0	95.0	95.0	86.5
S. Ohio River	97.0	96.5	91.0	76.0
Wheeling	99.0	100.0	97.0	98.0
St. Louis	106.0	106.0	102.0	96.0
Northeast	87.0	85.0	82.0	84.0
Aggregate	99.5	100.0	97.5	92.5

*Revised

Prices At A Glance

(cents per lb unless otherwise noted)

	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.174	5.174	5.174	4.797
Pig Iron (Gross Ton)	$59.09	$59.09	$59.09	$56.59
Scrap, No. 1 hvy (gross ton)	$47.83	$47.83	$49.50	$37.58
Nonferrous				
Aluminum ingot	24.40	24.40	24.40	23.20
Copper, electrolytic	46.00	46.00	43.00	33.00
Lead, St. Louis	15.80	15.80	15.80	14.80
Magnesium	33.25	33.25	33.25	27.75
Nickel, electrolytic	64.50	64.50	64.50	67.67
Tin, Straits, N. Y.	101.25	101.00	102.00	91.125
Zinc, E. St. Louis	13.50	13.50	13.50	11.50

Railroad Freight Rates Rise

Recent freight rate hikes will boost metal product shipping costs by 6 pct . . . Auto outlook has Chicago mills blowing hot and cold . . . Bars, plates continue tight.

◆ NEW RAIL freight rates, placed in effect this week, will increase the cost of shipping metal products by 6 pct, although the general effect of the action on all commodities moved by rail is to be nearer to a 5 pct rise.

Reason for the lesser boost for railroad shipments generally is the Interstate Commerce Commission ruling that lower advances will apply on rates for lumber, some minerals, and a number of farm products.

While the higher charges will give the rail lines less than the $590 million they wanted in added revenues, shippers will have to pay about $423 million more per year for freight.

The ICC ruling, given just over two months after the railroads applied for a 7 pct rate climb, is causing a number of carriers to complain that the additional returns will not be adequate to cover higher operating costs.

Specifically held down in the ICC approval are carload rates on coke, anthracite coal, and bituminous, except lignite.

Increases for these materials are up to 6 pct, or a maximum of 15¢ per net ton. Lignite and lignite briquet rates are boosted 3 pct, or a maximum of 7¢ per net ton.

SHEETS AND STRIP . . . **Chicago** mills are now blowing hot and cold on the auto outlook. Sheet producers will have ample business to carry them through the first half of the year, as will the strip people. The only difference will be which customers will get the steel. Last week, mills in the area felt sheet was tightening. This week, some feel that the picture might ease slightly in the automotive department. If so, this will mean producers could free a little sheet for warehouses and appliance fabricators, construction equipment makers who need hot-rolled sheet in heavier gages, and farm equipment manufacturers. Perhaps significant, however, is that although one auto maker has cut back some orders with local mills, his suppliers have not. Thus far this limited cutback is an isolated instance and it isn't confirmed by either components suppliers or other raw materials suppliers. In **Cleveland**, indications are that most northern Ohio mills are booked to capacity for the first half of the year on all flat-rolled carbon steel products. The few cancellations hitting the mills, principally from auto plants and their suppliers, are quickly gobbled up elsewhere. April is expected to be the low point in pressure from Detroit for delivery, but some salesmen privately admit they may already be overbooked for May and June.

STAINLESS . . . Also in **Cleveland**, there are signs that some auto valve suppliers, who use special grades of stainless, are cutting down on inventories. In the face of some auto production cutbacks, they point out, warehousing is proving more costly than the anticipated price increase following labor settlements. Sixty-day inventories have been cut to 30 days, and 90-day stocks to about 45 days in many cases.

BARS . . . From the **West Coast**, latest indications are that mills there are already sold out through May on all sizes and types of bar products. Some producers say they could book even more bar sales, but that for the time being they prefer to play it safe and not get too far ahead on customer order demands. And in **Chicago**, despite continuing reports of some easing in bar availability, buyers say deliveries are still tight, even on cold-finished bar. Hot-rolled bar is still on allocation and mills report they're swamped with orders for this item. Merchant quality bar is strong, and as the spring building season gets underway, mesh and rebar are showing new spurts of activity.

PLATE . . . **Eastern** plate fabricators continue to report heavy demand for both wide and narrow gage widths coming in from all quarters. Major producers say they expect business to continuue at above-capacity levels all through the second half and probably carrying over into the third quarter. **Chicago** plate producers now expect demand to continue at present high levels for at least the next year and a half. Optimistic outlook is based in large measure on capacity bookings which will show little signs of letup from linepipe and tank fabricators, not to mention the railroads. And, plate inventories at the warehouse level are just about nil in **Cleveland** with little improvement expected in the months ahead.

STRUCTURALS . . . Heavy demand for wide-flange beams and standard structurals continues unabated up and down the **West Coast**. At the moment, construction industries are leading the pace with big projects in the works all over the Far-west. Things are so tight in **Cleveland** that warehouse customers are now limited as to the amount of light structurals which can be included in orders from two major producers. Light fabrication orders are being almost wholly predicated on ability to deliver rather than price. Some **Chicago** mills say structurals are in the same boat as plate: demand looks solid for at least the next year.

WIRE PRODUCTS . . . Virtually all market areas report continued good consumer demand for most grades of manufacturers' wire. Mills now are looking for a normal seasonal pickup in merchant wire. A few mills in the **Chicago** area believe that 1956 will equal, if not exceed, 1955 in most wire product lines.

Purchasing Agent's Checklist

TOOLS: How tape controls are used . . . . . p. 118

Builders seek to speed delivery . . . . . p. 143

How to get more for your tooling dollar . . . . . p. 153

TINPLATE: Market threat looms p. 120

Comparison of Prices

(Effective March 6, 1956)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Mar. 6 1956	Feb. 28 1956	Feb. 7 1956	Mar. 8 1955
Flat-Rolled Steel: (per pound)				
Hot-rolled sheets	4.325¢	4.325¢	4.325¢	4.05¢
Cold-rolled sheets	5.325	5.325	5.325	4.95
Galvanized sheets (10 ga.)	5.85	5.85	5.85	5.45
Hot-rolled strip	4.325	4.325	4.325	4.05
Cold-rolled strip	6.29	6.29	6.29	5.79
Plate	4.52	4.52	4.52	4.225
Plates, wrought iron	10.40	10.40	10.40	9.30
Stainl's C-R strip (No. 302)	44.50	44.50	44.50	42.00
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$9.05	$9.05	$9.05	$9.05
Tinplate, electro (0.50 lb.)	7.75	7.75	7.75	7.75
Special coated mfg. ternes	7.85	7.85	7.85	7.85
Bars and Shapes: (per pound)				
Merchant bars	4.65¢	4.65¢	4.65¢	4.30¢
Cold finished bars	5.90	5.90	5.90	5.40
Alloy bars	5.65	5.65	5.65	5.075
Structural shapes	4.60	4.60	4.60	4.25
Stainless bars (No. 302)	38.25	38.25	38.25	35.50
Wrought iron bars	11.50	11.50	11.50	10.40
Wire: (per pound)				
Bright wire	6.25¢	6.25¢	6.25¢	5.75¢
Rails: (per 100 lb.)				
Heavy rails	$4.725	$4.725	$4.725	$4.45
Light rails	5.65	5.65	5.65	5.35
Semifinish Steel: (per net ton)				
Rerolling billets	$68.50	$68.50	$68.50	$64.00
Slabs, rerolling	68.50	68.50	68.50	64.00
Forging billets	84.50	84.50	84.50	78.00
Alloy blooms, billets, slabs	96.00	96.00	96.00	86.00
Wire Rod and Skelp: (per pound)				
Wire rods	5.025¢	5.025¢	5.025¢	4.675¢
Skelp	4.225	4.225	4.225	3.90
Finished Steel Composite: (per pound)				
Base price	5.174¢	5.174¢	5.174¢	4.797¢

	Mar. 6 1956	Feb. 28 1956	Feb. 7 1956	Mar. 8 1955
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$63.69	$63.69	$63.69	$61.19
Foundry, Valley	59.00	59.00	59.00	56.50
Foundry, Southern Cin'ti	62.93	62.93	62.93	60.43
Foundry, Birmingham	55.00	55.00	55.00	52.88
Foundry, Chicago	59.00	59.00	59.00	56.50
Basic, del'd Philadelphia	62.77	62.77	62.77	60.27
Basic, Valley furnace	58.50	58.50	58.50	56.00
Malleable, Chicago	59.00	59.00	59.00	56.50
Malleable, Valley	59.00	59.00	59.00	56.50
Ferromanganese‡, cents per lb.	9.50¢	9.50¢	9.50¢	9.50¢
‡ 74.76 pct Mn base.				
Pig Iron Composite: (per gross ton)				
Pig iron	$59.09	$59.09	$59.09	$56.59
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$47.50	$47.50	$49.50	$38.50
No. 1 steel, Phila. area	49.50	49.50	51.50	39.75
No. 1 steel, Chicago	46.50	46.50	47.50	34.50
No. 1 bundles, Detroit	44.50	44.50	44.50	29.00
Low phos., Youngstown	53.50	53.50	54.50	37.50
No. 1 mach'y cast, Pittsburgh	55.50	55.50	55.50	43.50
No. 1 mach'y cast, Philadel'a	54.50	54.50	54.50	44.50
No. 1 mach'y cast, Chicago	51.50	50.50	52.50	45.50
Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	$47.83	$47.83	$49.50	$37.58
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.25	$14.25	$14.25	$14.38
Foundry coke, prompt	16.25	16.25	16.25	16.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	$46.00	$46.00	$43.00	$33.00
Copper, Lake, Conn.	46.00	43.00	43.00	33.00
Tin, Straits, New York	101.25†	104.74	99.00	90.625
Zinc, East St. Louis	13.50	13.50	13.50	11.50
Lead, St. Louis	15.80	15.80	15.80	14.80
Aluminum, virgin ingot	24.40	24.40	24.40	23.20
Nickel, electrolytic	64.50	64.50	64.50	67.67
Magnesium, ingot	33.25	33.25	33.25	27.75
Antimony, Laredo, Tex.	33.00	33.00	33.00	28.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite
Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite
Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite
Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

← To identify producers, see Key on P. 264 →

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem *B3*	60.50	61.00	61.50	62.00	.....
Birdsboro, Pa. *B6*	60.50	61.00	61.50	62.00	.....
Birmingham *R3*	54.50	55.00*	.....	.....	.....
Birmingham *W9*	54.50	55.00*	59.00	.....	.....
Birmingham *U4*	54.50	55.00*	59.00	.....	.....
Buffalo *R3*	58.50	59.00	59.50	60.00	.....
Buffalo *H1*	58.50	59.00	59.50	.....	.....
Buffalo *W6*	58.50	59.00	59.50	60.00	.....
Chester *C17*	60.50	61.00	61.50	.....	.....
Chicago *I4*	58.50	59.00	59.00	59.50	.....
Cleveland *A5*	58.50	59.00	59.00	59.50	63.50
Cleveland *R3*	58.50	59.00	59.00	59.50	.....
Duluth *I4*	58.50	59.00	59.00	59.50	.....
Erie *I4*	58.50	59.00	59.00	59.50	.....
Everett *M6*	.....	62.50	63.00	.....	.....
Fontana *K1*	64.50	65.00	.....	.....	.....
Geneva, Utah *C7*	58.50	59.00	.....	.....	.....
Granite City *G2*	60.40	60.90	61.40	.....	.....
Hubbard *Y1*	.....	.....	59.00	.....	.....
Lone Star *L3*	.....	55.00	.....	.....	.....
Midland *C11*	58.50	.....	.....	.....	.....
Minnequa *C6*	60.50	61.00	61.50	.....	.....
Monessen *P6*	58.50	.....	.....	.....	.....
Neville Is. *P4*	58.50	59.00	59.00	.....	.....
N. Tonawanda *T1*	.....	59.00	59.50	.....	.....
Pittsburgh *U1*	58.50	.....	.....	59.50	.....
Sharpsville *S3*	58.50	59.00	59.00	59.50	.....
So. Chicago *R3*	58.50	.....	59.00	.....	.....
Steelton *B3*	60.50	61.00	61.50	62.00	66.50
Swedeland *A2*	60.50	61.00	61.50	62.00	.....
Toledo *I4*	58.50	59.00	59.00	59.50	.....
Troy, N. Y. *R3*	60.50	61.00	61.50	62.00	66.50
Youngstown *Y1*	.....	.....	59.00	59.50	.....

DIFFERENTIALS: Add, 50¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese or portion thereof over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional, 0.25 pct nickel.

* Add $1.00 for 0.31-0.69 pct phos.

Silvery Iron Buffalo, *H1*, $68.75; Jackson, *J1*, *G1*, $67.50. Add $1.25 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add 75¢ for each 0.50 pct manganese over 1.0 pct. Bessemer ferrosilicon prices are $1 over comparable silvery iron.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	301	302	303	304	316	321	348	410	416	430
Ingots, rerolling	17.75	19.00	—	20.25	31.50	25.00	33.75	15.00	—	15.25
Slabs, billets, rerolling	22.25	24.75	26.75	26.00	40.25	32.00	43.00	19.50	—	19.75
Forg. discs, die blocks, rings	—	—	—	—	—	—	—	—	—	—
Billets, forging	31.75	32.00	34.75	33.75	51.25	38.25	51.00	25.50	26.00	26.00
Bars, wires, structurals	38.00	38.25	41.00	40.25	60.75	45.25	60.00	30.50	31.00	31.00
Plates	40.00	40.25	42.75	43.00	64.00	49.25	64.75	31.75	32.25	32.25
Sheets	44.25	44.50	52.25	47.25	68.25	54.25	73.50	36.25	—	36.75
Strip, hot-rolled	32.00	34.50	—	37.25	58.25	44.25	50.75	—	—	—
Strip, cold-rolled	41.00	44.50	—	47.25	68.25	54.25	73.50	36.25	—	36.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11*; Brackenridge, Pa., *A3*; Butler, Pa., *A7*; McKeesport, Pa., *U1*; Washington, Pa., *W2*. *J2*; Baltimore, *E1*; Middletown, O., *A7*; Massillon, O., *R3*; Gary, *U1*; Bridgeville, Pa., *U2*; New Castle, Ind., *I2*; Ft. Wayne, *J4*; Philadelphia, *D5*.

Strip: Midland, Pa., *C11*; Cleveland, *A5*; Carnegie, Pa., *S9*; McKeesport, Pa., *F1*; Reading, Pa., *C2*; Washington, Pa., *W2*; W. Leechburg, Pa., *A3*; Bridgeville, Pa., *U2*; Detroit, *M2*; Canton Massillon, O., *R3*; Middletown, O., *A7*; Harrison, N. J., *D3*; Youngstown, *C5*; Sharon, Pa., *S1*; Butler, Pa., *A7*; Wallingford, Conn., *U3* (.25¢ per lb higher); *W1* (.25¢ per lb higher); New Bedford, Mass., *R6*.

Bar: Baltimore, *A7*; Duquesne, Pa., *U1*; Munhall, Pa., *U1*; Reading, Pa., *C2*; Titusville, Pa., *U2*; Washington, Pa., *J2*; McKeesport, Pa., *U1*, *F1*; Bridgeville, Pa., *U2*; Dunkirk, N. Y., *A3*; Massillon, O., *R3*; Chicago, *U1*; Syracuse, N. Y., *C11*; Watervliet, N. Y., *A3*; Waukegan, *A5*; Canton, O., *T5*; Ft. Wayne, *I4*; Philadelphia, *D5*; Detroit, *R5*.

Wire: Waukegan, *A5*; Massillon, O., *R3*; McKeesport, Pa., *F1*; Ft. Wayne, *J4*; Harrison, N. J., *D3*; Baltimore, *A7*; Dunkirk, *A3*; Monessen, *P1*; Syracuse, *C11*; Bridgeville, *U2*.

Structurals: Baltimore, *A7*; Massillon, O., *R3*; Chicago, Ill., *J4*; Watervliet, N. Y., *A3*; Syracuse, *C11*.

Plates: Brackenridge, Pa., *A3*; Chicago, *U1*; Munhall, Pa., *U1*; Midland, Pa., *C11*; New Castle, Ind., *I2*; Middletown, *A7*; Washington, Pa., *J2*; Cleveland, Massillon, *R3*; Coatesville, Pa., *C15*; Philadelphia, *D5*.

Forged discs, die blocks, rings: Pittsburgh, *C11*; Syracuse, *C11*; Ferndale, Mich., *A3*; Washington, Pa., *J2*.

Forgings billets: Midland, Pa., *C11*; Baltimore, *A7*; Washington, Pa., *J2*; McKeesport, *F1*; Massillon, Canton, O., *R3*; Watervliet *A3*; Pittsburgh, Chicago, *U1*; Syracuse, *C11*; Detroit, *R5*.

Market Takes A Firmer Tone

No. 1 heavy melting price holds steady in major market centers . . . Some scrap grades in Chicago already show price advances . . . Iron Age composite holds at $47.83.

◆ THE MARKET took on a firmer tone in the major steelmaking centers this week.

While No. 1 heavy melting prices in Pittsburgh, Chicago and Philadelphia continued unchanged, brokers and dealers say mill buying of No. 1 grades continues at a good clip in the face of dwindling stocks of top-grade material. Cleveland steelmaking grades were up $1 per ton.

The firmer market tone in Pittsburgh was buoyed by a fringe area mill purchase of a small tonnage of steelmaking grades at prices equivalent to a higher price than that holding shakily in Pittsburgh.

In the absence of heavy mill buying in Chicago, broker buying prices continued to advance. Grades already showing price advances include factory bundles, turnings, some electric furnace, and a few railroad specialties.

Only weakness showing up in the latest Philadelphia listings is in the No. 2 steelmaking grades, off $1, due to the momentary heavy supply and limited interest being shown by consumers in the area.

Elsewhere, in such centers as New York, Detroit and Boston, market activity slowed to an even keel with steelmaking grades holding firm. Some price softenings showed up in Birmingham, where prices were off $2 a ton on limited tonnage, and in Buffalo where No. 2 steel dropped $2 on the basis of latest sales.

THE IRON AGE scrap composite price is holding at $47.83.

Pittsburgh . . . The market took on a much firmer tone this week. Latest railroad and industrial lists were higher. A mill on the fringe of the district bought a small tonnage of steelmaking grades at prices equivalent to a higher price than that holding shakily in Pittsburgh. Dealers' stocks are low and it's getting tougher to fill latest orders. Latest railroad list kicked up the price of No. 1 railroad heavy melting to $56.50 delivered. Low phos rose $2 per ton to $57 delivered.

Chicago . . . The local market continued to tighten as scrap income from other areas continued to dwindle. In an absence of heavy mill purchasing, broker buying prices continued to advance. No. 2 heavy melting, though confirmed at $38 by a recent sale, moved to $37.50 broker buying and reports of broker buying of the grade at $38 are increasingly common. Factory bundles went up as did turnings, some electric furnace, and a few railroad grades. The market is expected to rise, but at press time mills continued to resist the advance.

Philadelphia . . . Brokers and dealers report a stable to steady market in steelmaking grades with only slight weakness being shown in the No. 2 grades, centering primarily on No. 2 bundles, which are in plentiful supply at the moment. Other grades continue to hold firm. Export activity is limited with little price talk so far on forthcoming April shipments.

New York . . . "This market is on a temporary plateau," is the way one broker sums up current activity. And the trade concurs. Major activity is filling recent orders from a consumer in an adjacent district at unchanged prices. Cast grades are off $1 due to a temporary hold-up in buying from nearby pipe foundries.

Detroit . . . The market has leveled off on a firm tone here. Brokers are not placing any new orders for dealer scrap and predictions are that they will not at least for another week. Reason is a wildcat strike at one of the local mills which has been going on for over a week.

Cleveland . . . Cleveland price edged up $1 on steelmaking grades on the basis of a sale to a local consumer from several restricted dealer yards at $51 a ton. Two automotive lists also went for over $52.50 f.o.b. track in the Cleveland area, further bolstering the market. In the Youngstown area, dealer scrap was bought within quoted limits at $53 and some railroad and electric furnace grades went at $54. Secondary grades made a recovery to $44.

Birmingham . . . There has been little broker or mill activity in the market here. Expecting considerable open hearth buying shortly, brokers and dealers are holding on to this grade to see what the mills will offer. No. 1 steelmaking grades were off $2 this week on limited tonnage.

St. Louis . . . No. 1 bundles advanced $2 per ton and No. 2 bundles $1 per ton to meet competition of Chicago buyers seeking material in the St. Louis area and to stimulate the movement to consumers here. The movement in the last few weeks has been below the melt but the new prices are expected to increase it.

Cincinnati . . . local market picked up 50 cents on a new purchase by a fringe area consumer at $49 delivered for No. 1 heavy melting. No. 2 heavy melting picked up $1. Most local dealers feel the bottom has been reached and a mild upturn is in prospect for the next few weeks.

Buffalo . . . The area's largest purchaser bought substantial amounts of No. 2 heavy melting and No. 2 bundles at $2 lower than quoted prices. Small quantities of machine shop turnings also were purchased at the quoted price.

Boston . . . One of the biggest factors in this market, export business, is showing a drop in activity which has already been reflected in price softenings on the domestic scene. Coupled with a falloff in domestic demand generally, the market is quiet with some additional price softenings showing up this past week in some secondary grades.

West Coast . . . Prices dropped in Los Angeles, San Francisco, and Seattle. Almost all top grades are down $4. Mills say they're not buying any more than their melt, inventories are plenty healthy.

Pictured is the new H-5 Hydrocrane erecting a warehouse. Nine-ton capacity as a crane, ½-yd. as an excavator, yet it mounts on a *conventional truck, new or used, without sacrificing* work capacity. You can choose the truck that fits your needs best.

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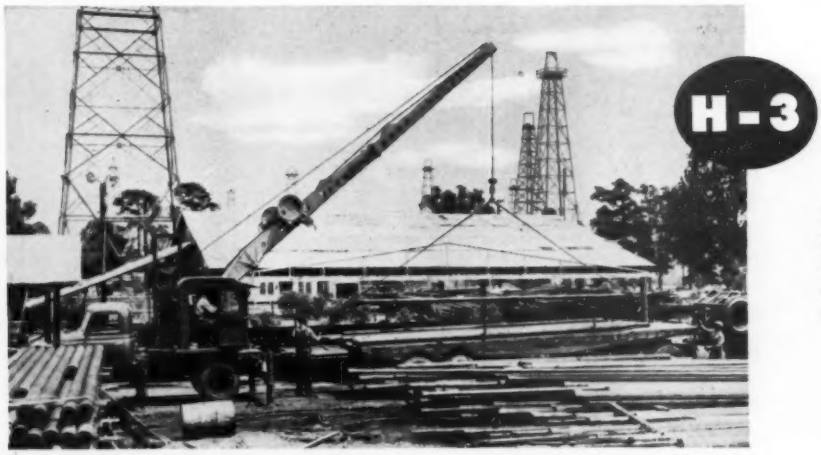

Here the H-3 Hydrocrane handles pipe in an oil field supply company's yard. Smooth, exact control speeds handling, greatly reduces possibility of damage to pipe and supplies.

Choose the Hydrocrane that's best for your jobs. Bucyrus-Erie now offers this multi-job, all-hydraulic truck-crane in two popular sizes. First there's the 4-ton, ⅜-yd. H-3 — a long-standing favorite among users on a wide variety of erecting and digging jobs . . . available with 18- to 26-ft. standard telescoping boom or 30- to 38-ft. erector's boom.

And now Bucyrus-Erie brings you the new higher-reaching, bigger-digging, 9-ton, ½-yd. H-5 Hydrocrane. Standard boom telescopes hydraulically from 24 to 36 feet, high-lift boom from 38 to 50 feet — and can be retracted to 25 feet for travel. Both models bring you all the operating advantages of full hydraulic power and control of all work functions, 45- to 50-mph top travel speed, exceptional ability for working and maneuvering in close quarters.

For some users the Model H-3 is still the best buy; for others the greater capacity and long boom reach of the H-5 will open the way to bigger savings on more jobs. Your Bucyrus-Erie distributor can help you choose the right one for your specific needs. See him now for full details.

112H55

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South Milwaukee Wisconsin

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Scrap Prices *(Effective March 6, 1956)*

Pittsburgh

No. 1 hvy. melting	$47.00 to $48.00
No. 2 hvy. melting	43.00 to 44.00
No. 1 bundles	47.00 to 48.00
No. 2 bundles	40.00 to 41.00
Machine shop turn	33.00 to 34.00
Mixed bor. and ms. turn	33.00 to 34.00
Shoveling turnings	36.00 to 37.00
Cast iron borings	36.00 to 37.00
Low phos. punch'gs plate	56.00 to 57.00
Heavy turnings	44.00 to 45.00
No. 1 RR hvy. melting	55.50 to 56.50
Scrap rails, random lgth.	62.00 to 63.00
Rails 2 ft and under	67.00 to 68.00
RR. steel wheels	59.00 to 60.00
RR. spring steel	59.00 to 60.00
RR. couplers and knuckles	59.00 to 60.00
No. 1 machinery cast	55.00 to 56.00
Cupola cast	48.00 to 49.00
Heavy breakable cast	45.00 to 46.00

Chicago

No. 1 hvy. melting	$46.00 to $47.00
No. 2 hvy. melting	37.00 to 38.00
No. 1 factory bundles	51.00 to 52.00
No. 1 dealers' bundles	46.00 to 47.00
No. 2 dealers' bundles	36.00 to 37.00
Machine shop turn	27.00 to 28.00
Mixed bor. and turn	29.00 to 30.00
Shoveling turnings	29.00 to 30.00
Cast iron borings	29.00 to 30.00
Low phos. forge crops	56.00 to 57.00
Low phos. punch'gs plate	53.00 to 54.00
Low phos. 3 ft and under	52.00 to 53.00
No. 1 RR. hvy. melting	50.00 to 51.00
Scrap rails, random lgth	59.00 to 60.00
Rerolling rails	66.00 to 67.00
Rails 2 ft and under	64.00 to 65.00
Locomotive tires, cut	55.00 to 57.00
Cut bolsters & side frames	55.00 to 56.00
Angles and splice bars	62.00 to 63.00
RR. steel car axles	63.00 to 64.00
RR. couplers and knuckles	55.00 to 56.00
No. 1 machinery cast	51.00 to 52.00
Cupola cast	47.00 to 48.00
Heavy breakable cast	39.00 to 40.00
Cast iron brake shoes	37.00 to 38.00
Cast iron car wheels	45.00 to 46.00
Malleable	58.00 to 59.00
Stove plate	38.00 to 39.00

Philadelphia Area

No. 1 hvy. melting	$49.00 to $50.00
No. 2 hvy melting	42.00 to 43.00
No. 1 bundles	49.00 to 50.00
No. 2 bundles	39.00 to 40.00
Machine shop turn	34.00 to 35.00
Mixed bor. short turn	35.00 to 36.00
Cast iron borings	35.50 to 36.50
Shoveling turnings	38.00 to 39.00
Clean cast chem. borings	41.00 to 42.00
Low phos. 5 ft and under	53.00 to 54.00
Low phos. 2 ft and under	55.00 to 56.00
Low phos. punch'gs	55.00 to 56.00
Elec. furnace bundles	52.00 to 53.00
Heavy turnings	45.00 to 46.00
RR. steel wheels	57.00 to 58.00
RR. spring steel	57.00 to 58.00
Rails 18 in. and under	65.00 to 66.00
Cupola cast	48.00 to 50.00
Heavy breakable cast	52.00 to 53.00
Cast iron car wheels	58.00 to 59.00
Malleable	66.50 to 67.50
Unstripped motor blocks	38.00 to 39.00
No. 1 machinery cast	54.00 to 55.00

Cleveland

No. 1 hvy. melting	$50.00 to $51.00
No. 2 hvy. melting	45.00 to 46.00
No. 1 bundles	50.00 to 51.00
No. 2 bundles	38.00 to 39.00
No. 1 busheling	50.00 to 51.00
Machine shop turn.	29.00 to 30.00
Mixed bor. and turn.	33.00 to 34.00
Shoveling turnings	33.00 to 34.00
Cast iron borings	33.00 to 34.00
Cut struct'r'l & plates, 2 ft & under	54.00 to 55.00
Drop forge flashings	50.00 to 51.00
Low phos. punch'gs, plate	50.50 to 51.50
Foundry steel, 2 ft & under	53.00 to 54.00
No. 1 RR. heavy melting	51.00 to 52.00
Rails 2 ft and under	67.00 to 68.00
Rails 18 in. and under	68.00 to 69.00
Railroad grate bars	40.00 to 41.00
Steel axle turnings	34.00 to 35.00
Railroad cast	54.00 to 55.00
No. 1 machinery cast	53.00 to 54.00
Stove plate	51.00 to 52.00
Malleable	57.00 to 58.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Youngstown

No. 1 hvy. melting	$52.00 to $53.00
No. 2 hvy. melting	43.00 to 44.00
No. 1 bundles	52.00 to 53.00
No. 2 bundles	40.00 to 41.00
Machine shop turn.	29.00 to 30.00
Shoveling turnings	34.00 to 35.00
Cast iron borings	33.00 to 34.00
Low phos. plate	53.00 to 54.00

Buffalo

No. 1 hvy. melting	$45.00 to $46.00
No. 2 hvy. melting	37.00 to 38.00
No. 1 busheling	45.00 to 46.00
No. 1 bundles	45.00 to 46.00
No. 2 bundles	33.00 to 34.00
Machine shop turn.	27.00 to 28.00
Mixed bor. and turn.	28.00 to 29.00
Shoveling turnings	29.00 to 30.00
Cast iron borings	29.00 to 30.00
Low phos. plate	54.00 to 55.00
Scrap rails, random lgth.	51.00 to 52.00
Rails 2 ft and under	65.00 to 66.00
RR. steel wheels	55.00 to 56.00
RR. spring steel	55.00 to 56.00
RR. couplers and knuckles	55.00 to 56.00
No. 1 machinery cast	52.00 to 53.00
No. 1 cupola cast	48.00 to 49.00

Detroit

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$44.00 to $45.00
No. 2 hvy. melting	32.00 to 33.00
No. 1 bundles, openhearth	44.00 to 45.00
No. 2 bundles	32.00 to 33.00
New busheling	44.00 to 45.00
Drop forge flashings	43.50 to 44.50
Machine shop turn.	20.00 to 21.00
Mixed bor. and turn.	23.00 to 24.00
Shoveling turnings	23.00 to 24.00
Cast iron borings	23.00 to 24.00
Low phos. punch'gs, plate	45.00 to 46.00
No. 1 cupola cast.	44.00 to 45.00
Heavy breakable cast	37.00 to 38.00
Stove plate	38.00 to 39.00
Automotive cast.	48.00 to 49.00

St. Louis

No. 1 hvy. melting	$40.50 to $41.50
No. 2 hvy. melting	37.50 to 38.00
No. 1 bundles	42.50 to 43.50
No. 2 bundles	33.00 to 34.00
Machine shop turn.	26.00 to 27.00
Cast iron borings	28.00 to 29.00
Shoveling turnings	28.00 to 29.00
No. 1 RR. hvy. melting	48.50 to 49.50
Rails, random lengths	56.00 to 57.00
Rails 18 in. and under	63.00 to 64.00
Locomotive tires uncut	53.00 to 54.00
Angles and splice bars	53.00 to 54.00
Std. steel car axles	58.00 to 59.00
RR. specialties	54.00 to 55.00
Cupola cast	47.00 to 48.00
Heavy breakable cast.	37.00 to 38.00
Cast iron brake shoes	37.00 to 38.00
Stove plate	38.00 to 39.00
Cast iron car wheels	44.00 to 45.00
Rerolling rails	65.00 to 66.00
Malleable	50.00 to 51.00
Unstripped motor blocks	37.00 to 38.00

Boston

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	32.00 to 33.00
No. 1 bundles	39.00 to 40.00
No. 2 bundles	30.00 to 31.00
No. 1 busheling	39.00 to 40.00
Elec. furnace, 3 ft & under	42.00 to 43.00
Machine shop turn.	23.50 to 24.50
Mixed bor. and short turn.	26.00 to 27.00
Shoveling turnings	27.00 to 28.00
Clean cast chem. borings	29.00 to 30.00
No. 1 machinery cast	43.50 to 44.50
Mixed cupola cast.	39.00 to 40.00
Heavy breakable cast.	41.00 to 42.00
Stove plate	37.00 to 38.00
Unstripped motor blocks	22.00 to 23.00

New York

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$43.00 to $44.00
No. 2 hvy. melting	38.00 to 39.00
No. 2 bundles	31.00 to 32.00
Machine shop turn.	23.00 to 24.00
Mixed bor. and turn.	23.00 to 24.00
Shoveling turnings	26.00 to 27.00
Clean cast chem. borings	32.00 to 33.00
No. 1 machinery cast	48.00 to 49.00
Mixed yard cast	45.00 to 46.00
Charging box cast	45.00 to 46.00
Heavy breakable cast	45.00 to 46.00
Unstripped motor blocks	30.00 to 31.00

Birmingham

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	37.00 to 38.00
No. 1 bundles	39.00 to 40.00
No. 2 bundles	28.00 to 29.00
No. 1 busheling	39.00 to 40.00
Machine shop turn.	28.00 to 29.00
Shoveling turnings	29.00 to 30.00
Cast iron borings	20.50 to 21.50
Electric furnace bundles	44.00 to 45.00
Bar crops and plate	51.00 to 52.00
Structural and plate, 2 ft	50.00 to 51.00
No. 1 RR. hvy. melting	47.00 to 48.00
Scrap rails, random lgth.	58.00 to 59.00
Rails, 18 in. and under	61.00 to 62.00
Angles & splice bars	57.00 to 58.00
Rerolling rails	61.00 to 62.00
No. 1 cupola cast.	47.50 to 48.50
Stove plate	46.00 to 47.00
Charging box cast.	32.00 to 33.00
Cast iron car wheels	37.00 to 38.00
Unstripped motor blocks	37.00 to 38.00
Mashed tin cans	15.00 to 16.00

Cincinnati

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$45.50 to $46.50
No. 2 hvy. melting	38.00 to 39.00
No. 1 bundles	45.50 to 46.50
No. 2 bundles	35.00 to 36.00
Machine shop turn.	29.00 to 30.00
Mixed bor. and turn.	29.00 to 30.00
Shoveling turnings	31.00 to 32.00
Cast iron borings	30.00 to 31.00
Low phos. 18 in. & under	53.00 to 54.00
Rails, random lengths	58.00 to 59.00
Rails, 18 in. and under	65.00 to 66.00
No. 1 cupola cast.	45.00 to 46.00
Hvy. breakable cast.	42.00 to 43.00
Drop broken cast.	54.00 to 55.00

San Francisco

No. 1 hvy. melting	$36.00
No. 2 hvy. melting	30.00
No. 1 bundles	35.00
No. 2 bundles	26.00
No. 3 bundles	20.00
Machine shop turn.	18.00
Cast iron borings	20.00
No. 1 RR. hvy melting	36.00
No. 1 cupola cast.	45.00

Los Angeles

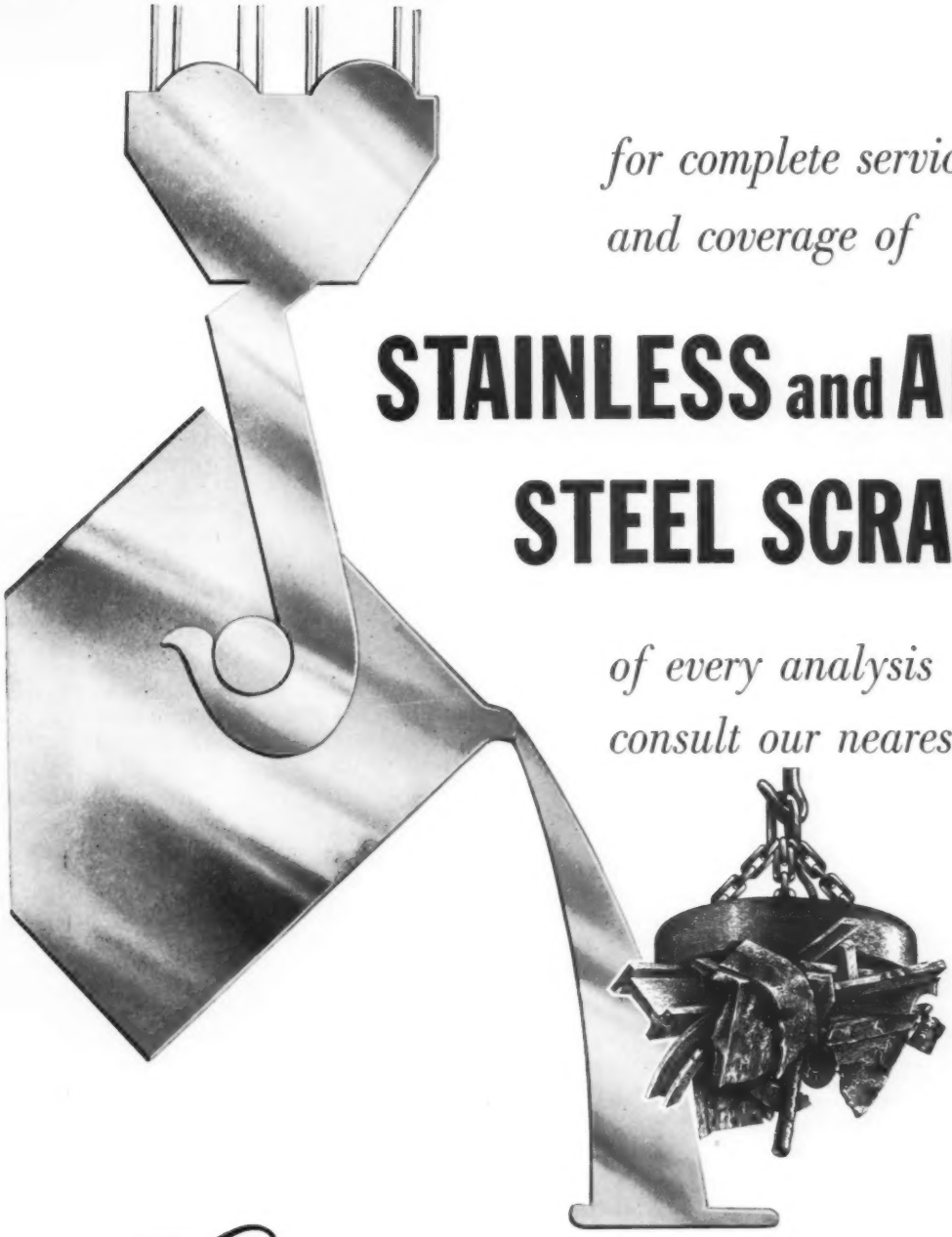
No. 1 hvy. melting	$38.00
No. 2 hvy. melting	32.00
No. 1 bundles	37.00
No. 2 bundles	28.00
No. 3 bundles	22.00
Machine shop turn.	18.00
Shoveling turnings	21.00
Cast iron borings	18.00
Elec. furn. 1 ft and under	38.00
No. 1 RR. hvy. melting	38.50
No. 1 cupola cast.	44.00

Seattle

No. 1 hvy. melting	$38.00
No. 2 hvy. melting	35.00
No. 2 bundles	26.00
No. 3 bundles	20.00
No. 1 cupola cast.	45.00
Mixed yard cast.	45.00

Hamilton, Ont.

No. 1 hvy. melting	$45.50
No. 2 hvy. melting	41.50
No. 1 bundles	45.50
No. 2 bundles	38.00
Mixed steel scrap	39.50
Bushelings	35.50
Bush., new fact., prep'd	43.50
Bush., new fact., unprep'd.	39.50
Machine shop turn.	18.00
Short steel turn.	27.50
Mixed bor. and turn.	$16.00 to 19.00
Rails, rerolling	53.50
Cast scrap	42.00 to 45.00



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IMPORT & EXPORT – **LIVINGSTON & SOUTHARD, INC.,** 99 Park Ave., New York, N. Y. • *Cable Address:* **FORENTRACO**

Copper Imports Down in 1955

Total copper imported in 1955 drops . . . Chile follows trend, but Peruvian imports up 50 pct . . . Copper from Peru may be key to alleviating Chilean price pressure.

◆ REPORT FROM the U. S. Bureau of the Census on imports of copper for 1955 indicate what just about everyone knew already—imports on the whole were down, and total imports from Chile were down.

A significant sidelight, however, is that imports from Peru were up about 50 pct. In terms of actual tonnages, the boost was not substantial. However, in view of the heavy investments in Peruvian copper announced in 1955 by a coalition of companies, any trend must be considered in the light of what, if anything, it foretells for the future.

Here is how 1955 stacked up compared to 1954 for Chile and Peru:

(TONS)	1955	1954	Dec. 1955	Nov. 1955
CHILE	226,043	266,994	20,166	24,246
PERU	31,101	22,450	4936	4358

It is obvious that Peru will not be in a position—at least in the near future—to challenge the Chilean position as one of the world's leading sources of copper. But it is possible that a continued improvement in Peruvian output could take the sting out of Chilean diplomatic pressures in the field of copper prices.

The increase in production in Peru in 1955 over 1954, while only about 11,000 tons, is nevertheless a 50 pct boost. Considering the fact that it will take several more years for the full effects of the American investments to be fully felt, it looks like Peruvian output is riding a steady upward curve.

Chile on the other hand is greatly affected by labor, social and economic conditions despite the substantial investments announced by Anaconda.

If the producing companies could be sure of an increasing supply from Peru, they would be in a position to take a stronger stand on prices. The high esteem in which the American dollar is held in Chile will assure a substantial amount of copper finding its way to this country, no matter what the European price is. And if the remainder could be supplied by Peru, Chilean pressure would be weakened.

Many producers will tell you, off the record, that 46¢ for copper, while in line with world price, is too high and invites increased competition from other metals. They could make a nice profit if the price were 6¢ cheaper. And yet recent rumors have suggested the possibility that copper will go even higher.

Copper may go higher, but (1) industry is resisting strongly, and (2) with no immediate labor trouble on the horizon, current supply is gaining on demand, which weakens Chile's position.

If the copper companies can get over the domestic labor negotiations hurdle in June without a serious stoppage, and Peru maintains a substantial percentage output increase, the long term outlook will brighten considerably.

TIN . . . Immediate outlook is much improved. The world market is again flirting with a price below $1.00 per lb. This is because (1) the threat of a strike in Malaya, while not completely over has subsided to the point where a compatible solution looks imminent and (2) Tengku Abdul Rahman, chief minister of the Malayan Federation, came back from his conference in London with a British promise of complete independence for his country by August 1957.

The easing of the strike threat eliminates any immediate reduction in shipments while the independence promise derails the communist terrorist machine and makes the future look brighter.

NICKEL . . . The government is making it easier to export certain nickel products. The Bureau of Foreign Commerce of the U. S. Commerce Dept. says it will receive through March 31 applications to export the following nickel products: Nickel in cast and rolled anodes, nickel and nickel alloy shot (schedule B 654502); and pure nickel powder (B 619159).

Previously, the government had ruled that applications to export these products had to be filed before Jan. 24 in order to be considered for licensing.

Daily Nonferrous Metal Prices

(Cents per lb except as noted)

	Feb. 29	Mar. 1	Mar. 2	Mar. 3	Mar. 5	Mar. 6
Copper, electro, Conn.	46.00	46.00	46.00	....	46.00	46.00
Copper, Lake, delivered	46.00	46.00	46.00	....	46.00	46.00
Tin, Straits, New York	101.50	101.00	100.00	....	101.25	101.25*
Zinc, East St. Louis	13.50	13.50	13.50	13.50	13.50	13.50
Lead, St. Louis	15.80	15.80	15.80	15.80	15.80	15.80

Note: Quotations are going prices. **Tentative*

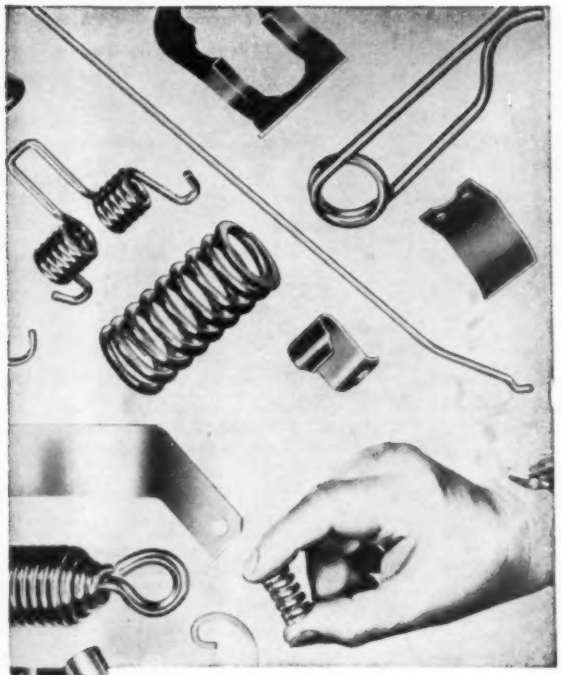
Monthly Average Metal Prices

(Cents per lb except as noted)

Average prices of the major nonferrous metals in January based on quotations appearing in THE IRON AGE, were as follows:

Electrolytic copper		Straits tin, New York	100.783
Del'd Conn. Valley	44.026	Zinc, E. St. Louis	13.50
Lake copper, delivered	43.789	Lead, St. Louis	15.80

Note: Quotations are going prices



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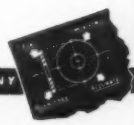

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Nonferrous Prices *(Effective March 6, 1956)*

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

ALUMINUM

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate

("F" temper except 6061-0)

Alloy	.032	.081	.136–.249	.250–S.
1100, 3003	40.8	38.7	37.5	36.5
5052	48.3	43.4	41.7	39.9
6061-0	45.4	41.2	39.4	39.2

Extruded Solid Shapes

Factor	6063 T-5	6063 T-6
6– 8	41.6–43.3	55.6–60.2
12–14	42.3–43.7	57.5–61.6
24–26	45.3–45.7	67.7–72.1
36–38	53.6–54.2	90.5–94.8

Screw Machine Stock—2011-T-3

Size*	¼	⅝–⅞	⅝–1	1¼–1½
Price	54.5	53.4	52.1	50.1

Roofing Sheet, Corrugated

(Per sheet, 26" wide base, 16,000 lb)

Length* →	72	96	120	144
019 gage	$1.295	$1.727	$2.160	$2.590
.024 gage	1.615	2.162	2.692	3.232

MAGNESIUM

(f.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type ↓ Gage →	.250–3.00	.250–2.00	.125	.064	.032
AZ31A Stand. Grade	.....	61	63.5	78	98
AZ31A Spec.	.....	79	83	100	142
Tread Plate	64	.....	66	.....	.....
Tooling Plate	65	.....	.....	.....	.....

Extruded Shapes

	1" diam. rod	shapes lb/ft 0.3	1.0	4.0	2" OD x ⅛" W. tubing
Comm. Grade (FS)	61.50	65.4–72.4	61.9–67.3	57.7–63.3	74.8
Spec. Grade (AZ31B)	73	76.9–83.9	73.4–78.8	69.3–73.7	86

Alloy Ingot

AZ91B (Die Casting) ..... 31 (delivered)
AZ63A, AZ92A, AZ91C (Sand Casting) 36 (Velasco, Tex.)

NICKEL, MONEL, INCONEL

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	102	83	99
Strip, CR	102	92	125
Rod, Bar, HR	87	74	93
Angles, HR	87	74	93
Plate, HR	97	87	95
Seamless tube	122	110	153
Shot, Blocks	...	71	...

COPPER, BRASS, BRONZE

(Freight included on 500 lbs)

	Sheet	Wire	Rod	Tube
Copper	70.63	.....	.....	67.32
Brass, 70/30	55.60	56.14	.....	58.51
Brass, Low	60.15	60.69	60.09	62.96
Brass, R L	61.79	62.33	61.73	64.60
Brass, Naval	58.90	65.96	53.21	62.06
Muntz Metal	56.94	52.75	52.75	.....
Comm. Bz.	63.98	64.52	63.92	66.54
Mang. Bz.	62.75	67.09	56.65	.....
Phos. Bz. 5%	85.37	85.87	85.87	.....

TITANIUM

(10,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, $13.10-$13.60; alloy $15.25-$15.75; Plate, HR, commercially pure, $10.50-$11.00; alloy, $11.50-$12.00. Wire, rolled and/or drawn, commercially pure, $9.50-$11.50; alloy, $11.50; Bar, HR or forged, commercially pure, $7.90-$8.15; alloy, $7.90-$8.10.

PRIMARY METAL

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb, freight allowed $24.40
Aluminum pig 22.50
Antimony, American, Laredo, Tex. 33.50
Beryllium copper, per lb conta'd Be. 43.00
Beryllium aluminum 5% Be, Dollars per lb contained Be 72.75
Bismuth, ton lots 2.25
Cadmium, del'd 1.70
Cobalt, 97-99% (per lb) .... 2.60 to 2.67
Copper, electro, Conn. Valley 46.00
Copper, Lake, delivered 46.00
Gold, U. S. Treas., per troy oz. 35.00
Indium, 99.9% dollars per troy oz.. 2.25
Iridium, dollars per troy oz. .. 100 to 120
Lead, St. Louis 15.80
Lead, New York 16.00
Magnesium, 99.8+%, f.o.b. Velasco, Tex., 10,000 lb, pig 32.50
ingot 33.25
Magnesium, sticks, 100 to 500 lb. 53.00
Mercury dollars per 76-lb flask, f.o.b. New York ..... 264 to 267
Nickel electro 64.50
Nickel oxide sinter at Copper Cliff, Ont., contained nickel 60.75
Palladium, dollars per troy oz. 23 to 24
Platinum, dollars per troy oz.. 97 to 107
Silver, New York, cents per troy oz. 91.125
Tin, New York 101.25*
Titanium sponge, grade A-1. 3.15 to 3.45
Zinc, East St. Louis 13.50
Zinc, New York 14.00
Zirconium, sponge 10.00
*Tentative

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5-5 ingot
No. 115 ..... 44.00
No. 120 ..... 43.00
No. 123 ..... 42.00
80-10-10 ingot
No. 305 ..... 47.75
No. 315 ..... 46.00
88-10-2 ingot
No. 210 ..... 60.75
No. 215 ..... 56.75
No. 245 ..... 50.75
Yellow ingot
No. 405 ..... 34.75
Manganese bronze
No. 421 ..... 39.25

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
0.30 copper max. 31.00-31.50
0.60 copper max. 30.75-31.25
Piston alloys (No. 122 type) .. 32.50-33.25
No. 12 alum. (No. 2 grade) .. 29.50-30.00
108 alloy 29.50-30.00
195 alloy 31.00-32.00
13 alloy (0.60 copper max.) .. 30.75-31.25
AXS-679 ..... 29.50-30.00

Steel deoxidizing aluminum, notch bar granulated or shot

Grade 1—95-97½% 29.00-30.00
Grade 2—92-95% 28.00-29.00
Grade 3—90-92% 27.50-28.50
Grade 4—85-90% 27.00-28.00

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	42	41⅝
Yellow brass	31¼	29
Red brass	37	36¼
Comm. bronze	38½	37⅝
Mang. bronze	29¼	28½
Yellow brass rod ends	31	....

Custom Smelters Scrap

Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 46½
No. 2 copper wire 45
Light copper 42½
*Refinery brass 41
* Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 46½
No. 2 copper wire 45
Light copper 42½
No. 1 composition 36½
No. 1 comp. turnings 36
Hvy. yellow brass solids .. 27
Brass pipe 29
Radiators 28½

Aluminum

Mixed old cast ..... 19½—20½
Mixed new clips ..... 20½—21½
Mixed turnings, dry ..... 20 —21

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire. 42 —43
No. 2 heavy copper and wire. 40 —41
Light copper ..... 38 —39
New type shell cuttings ... 38 —38½
Auto radiators (unsweated) .. 25 —25½
No. 1 composition ..... 33 —33½
No. 1 composition turnings .. 30½—31
Unlined red car boxes ..... 25 —25½
Cocks and faucets ..... 26½—27
Clean heavy yellow brass .. 21½—22½
Brass pipe ..... 26½—27½
New soft brass clippings .... 27½—28
No. 1 brass rod turnings ..... 25½—26

Aluminum

Alum. pistons and struts .. 17 —17½
Aluminum crankcases ..... 16¾—17¼
1100 (2S) aluminum clippings 19½—20
Old sheet and utensils ..... 16¾—17¼
Borings and turnings ..... 11½—12
Industrial castings ..... 16¾—17¼
2024 (24S) clippings ..... 18 —18½

Zinc

New zinc clippings ..... 8½— 9
Old zinc ..... 6 — 6½
Zinc routings 4¼
Old die cast scrap 3½

Nickel and Monel

Pure nickel clippings $1.50
Clean nickel turnings $1.25
Nickel anodes $1.50
Nickel rod ends $1.50
New Monel clippings 60
Clean Monel turnings 50
Old sheet Monel 55
Nickel silver clippings, mixed. 25
Nickel silver turnings, mixed. 21

Lead

Soft scrap lead ..... 12½—13
Battery plates (dry) ..... 7 — 7¼
Batteries, acid free 4½

Miscellaneous

Block tin ..... 84 —85
No. 1 pewter ..... 66 —67
Auto babbitt ..... 43½—44½
Mixed common babbitt 15½
Solder joints ..... 20 —20½
Siphon tops 50
Small foundry type ..... 16¼—16½
Monotype ..... 15½—16
Lino. and stereotype ..... 14½—15
Electrotype ..... 13 —13½
Hand picked type shells ..... 10½—11
Lino. and stereo. dross ..... 5¾— 6
Electro. dross ..... 4¾— 5

IRON AGE

STEEL PRICES

(Effective March 6, 1956)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$96.00 *B3*		4.65 *B3*	6.80 *B3*	4.65 *B3*						
	Buffalo, N. Y.	$68.50 *B3*	$84.50 *R3, B3*	$96.00 *R3, B3*	5.45 *B3*	4.65 *B3*	6.80 *B3*	4.65 *B3*	4.325 *R3,B3*	6.25 *B3* 6.25 *R3,S10*	6.425 *B3*	9.10 *B3*		
	Claymont, Del.													13.45 *C11*
	Harrison, N. J.													
	Conshohocken, Pa.								4.375 *A2*	6.30 *A2*	6.425 *A2*			
	New Bedford, Mass.									6.70 *R6*				
	Johnstown, Pa.	$68.50 *B3*	$84.50 *B3*	$96.00 *B3*		4.65 *B3*	6.80 *B3*							
	Boston, Mass.									6.80 *T8*				13.80 *T8*
	New Haven, Conn.									6.70 *D1* *A5*				
	Phoenixville, Pa.					5.15 *P2*		5.15 *P2*						
	Sparrows Pt., Md.								4.325 *B3*	6.25 *B3*	6.425 *B3*	9.10 *B3*		
	Bridgeport, Wallingford, Conn.	$73.50 *N8*	$89.50 *N8*						4.625 *N8*	6.70 *W1*			7.50 *N8*	
	Pawtucket, R. I. Worcester, Mass.									6.80 *N7* *A5*				*A5* 13.80 *N7*
MIDDLE WEST	Alton, Ill.								4.50 *L1*					
	Ashland, Ky.								4.325 *A7*					
	Canton-Massillon, Dover, Ohio		$86.50 *R3*	$96.00 *R3*										13.45 *G4*
	Chicago, Ill.	$68.50 *U1*	$84.50 *R3, U1,W8*	$96.00 *R3, U1,W8*	5.45 *U1*	4.60 *U1, W8*	6.75 *U1, Y1*	4.60 *U1*	4.55 *A1* 4.325 *N4,W8*	6.35 *A1,T8*			7.20 *W8*	13.45 *T8*
	Cleveland, Ohio									6.25 *A5,J3*		9.30 *A5*		13.45 *A5*
	Detroit, Mich.			$96.00 *R5*					4.425 *G3,M2*	6.35 *D1,D2, G3,M2,P11*	6.525 *G3*	9.20 *D2, G3*		
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	$68.50 *U1*	$84.50 *U1*	$96.00 *U1, Y1*	5.45 *I3*	4.60 *U1, I3*	6.75 *U1, I3*		4.325 *I3, U1,Y1*	6.35 *I3* 6.25 *Y1*	6.425 *I3, U1,Y1*	9.30 *Y1*	7.20 *Y1, U1*	
	Sterling, Ill.								4.425 *N4*					
	Indianapolis, Ind.									6.40 *C5*				
	Newport, Ky.												7.20 *N5*	
	Middletown, Ohio									6.45 *A7*				
	Niles, Warren, Ohio Sharon, Pa.	$68.50 *C10*	$84.50 *C10*	$96.00 *C10*					4.325 *S1, R3*	6.25 *S1, R3,T4*	6.425 *S1, R3*	9.10 *S1, R3*	7.20 *S1*	13.45 *S1*
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	$68.50 *U1, J3*	$84.50 *J3, U1,C11*	$96.00 *U1, C11*	5.45 *U1*	4.60 *U1, J3*	6.75 *U1, J3*	4.60 *U1*	4.325 *P6*	6.25 *S7,B4*			7.20 *S9*	13.45 *S9*
	Portsmouth, Ohio								4.325 *P7*					
	Weirton, Wheeling, Follansbee, W. Va.					4.60 *W3*			4.325 *W3*	6.25 *F3,W3*	6.425 *W3*	9.10 *W3*		
	Youngstown, Ohio		$84.50 *C10*	$96.00 *Y1, C10*			6.75 *Y1*		4.325 *U1, Y1*	6.25 *Y1,C5*	6.425 *U1, Y1*	9.30 *Y1*	7.20 *U1, Y1*	13.45 *C5*
WEST	Fontana, Cal.	$76.00 *K1*	$92.00 *K1*	$115.00 *K1*		5.25 *K1*	7.40 *K1*	5.40 *K1*	5.075 *K1*	8.00 *K1*	7.525 *K1*		8.85 *K1*	
	Geneva, Utah		$84.50 *C7*			4.60 *C7*	6.75 *C7*							
	Kansas City, Mo.					4.70 *S2*	6.85 *S2*				6.675 *S2*		7.45 *S2*	
	Los Angeles, Torrance, Cal.		$94.00 *B2*	$116.00 *B2*		5.30 *C7, B2*	7.45 *B2*		5.075 *C7, B2*	8.30 *C1*			8.40 *B2*	
	Minnequa, Colo.					4.90 *C6*			5.425 *C6*					
	Portland, Ore.					5.35 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$94.00 *B2*			5.25 *B2, P9*	7.40 *B2*		5.075 *B2, C7*					
	Seattle, Wash.		$98.00 *B2*			5.35 *B2*	7.50 *B2*		5.325 *B2*					
SOUTH	Atlanta, Ga.								4.525 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$68.50 *T2*	$84.50 *T2*			5.10 *C16* 4.60 *R3,T2*	6.75 *T2*		4.325 *R3,T2* 4.825 *C16*		6.425 *T2*			
	Houston, Lone Star, Tex.	$74.50 *L3*	$89.50 *S2*	$101.00 *S2*		4.70 *S2*	6.85 *S2*				6.675 *S2*		7.45 *S2*	

IRON AGE

STEEL PRICES

(Effective March 6, 1956)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized *10* ga.	Enameling *12* ga.	Long Terne *10* ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled *19* ga.		Cokes* *1.25*-lb. base box	Electro* *0.25*-lb. base box	Hollowware Enameling *29* ga.
EAST	Bethlehem, Pa.													
	Buffalo, N. Y.	4.325 *B1*	5.325 *B3*				6.375 *B3*	7.875 *B3*			5.375 *W6*	† Special coated mfg. terne deduct 50¢ from 1.25-lb. coke base box price. Can-making quality blackplate 55 to 128 lb. deduct $2.20 from 1.25-lb. coke base box. * COKES: 1.50-lb. add 25¢. ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.													
	Coatesville, Pa.													
	Conshohocken, Pa.	4.375 *A2*	5.375 *A2*				6.425 *A2*							
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.										5.375 *B3*			
	Fairless, Pa.	4.375 *U1*	5.375 *U1*				6.425 *U1*	7.925 *U1*				$9.30 *U1*	$8.00 *U1*	
	New Haven, Conn.													
	Phoenixville, Pa.													
	Sparrows Pt., Md.	4.325 *B3*	5.325 *B3*	5.85 *B3*			6.375 *B3*	7.875 *B3*	8.60 *B3*		5.475 *B3*	$9.30 *B3*	$8.00 *B3*	
	Worcester, Mass.										5.675 *A5*			
	Trenton, N. J.													
MIDDLE WEST	Alton, Ill.										5.55 *L1*			
	Ashland, Ky.	4.325 *A7*		5.85 *A7*	5.90 *A7*									
	Canton-Massillon, Dover, Ohio			5.85 *R1, R3*										
	Chicago, Joliet, Ill.	4.55 *A1* 4.325 *W8*					6.375 *U1*				5.375 *N4* 5.375 *A5, R3*			
	Sterling, Ill.										5.475 *N4*			
	Cleveland, Ohio	4.325 *J3, R3*	5.325 *J3, R3*		5.90 *R3*		6.375 *J3, R3*	7.875 *J3, R3*			5.375 *A5*			
	Detroit, Mich.	4.425 *G3, M2*	5.425 *G3* 5.325 *M2*				6.475 *G3*	7.975 *G3*						
	Newport, Ky.	4.325 *N5*	5.325 *N5*	5.85 *N5*										
	Gary, Ind. Harbor, Indiana	4.325 *I3, U1, Y1*	5.325 *I3, U1, Y1*	5.85 *U1, I3*	5.90 *U1, I3*	6.25 *U1*	6.375 *Y1, U1, I3*	7.875 *U1, Y1*			5.375 *Y1*	$9.20 *I3, U1, Y1*	$7.90 *I3, U1, Y1*	6.65 *U1, Y1*
	Granite City, Ill.	4.525 *G2*	5.525 *G2*	6.05 *G2*	6.10 *G2*								$8.00 *G2*	6.75 *G2*
	Kokomo, Ind.			5.95 *C9*							5.475 *C9*			
	Mansfield, Ohio	4.325 *E2*	5.325 *E2*			6.25 *E2*				*E2*				
	Middletown, Ohio		5.325 *A7*	5.85 *A7*	5.90 *A7*	6.25 *A7*								
	Niles, Warren, Ohio Sharon, Pa.	4.325 *S1, R3, N3*	5.325 *R3, N3*	5.85 *R3* 6.85 *N3*	5.90 *N3*	6.25 *N3*	6.375 *S1, R3*	7.875 *R3*				$9.20 *R3*	$7.90 *R3*	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	4.325 *J3, U1, P6*	5.325 *J3, U1, P6*	5.85 *U1*	5.90 *U1, A7*		6.375 *J3, U1*	7.875 *U1*	8.60 *U1*		5.025 *P6* 5.375 *A5*	$9.20 *J3, U1*	$7.90 *J3, U1*	6.65 *U1*
	Portsmouth, Ohio	4.325 *P7*	5.325 *P7*								5.375 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	4.325 *W3, W5*	5.325 *W3, W5, F3*	5.85 *W3, W5*		6.25 *W3, W5*	6.375 *W3*	7.875 *W3*				$9.20 *W3, W5*	$7.90 *W3, W5*	6.65 *F3, W5*
	Youngstown, Ohio	4.325 *U1, Y1*	5.325 *Y1*		5.90 *Y1*		6.375 *U1, Y1*	7.875 *Y1*			5.375 *Y1*			
WEST	Fontana, Cal.	5.075 *K1*	6.425 *K1*				7.125 *K1*	8.975 *K1*						
	Geneva, Utah	4.425 *C7*												
	Kansas City, Mo.										5.625 *S2*			
	Los Angeles, Torrance, Cal.										6.175 *B2*			
	Minnequa, Colo.										5.275 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.025 *C7*	6.275 *C7*	6.60 *C7*							5.675 *C7*	$9.95 *C7*	$8.65 *C7*	
	Seattle, Wash.													
SOUTH	Atlanta, Ga.													
	Fairfield, Ala. Alabama City, Ala.	4.325 *R3, T2*	5.325 *T2*	5.85 *R3, T2*			6.375 *T2*			5.625 *R3*	5.025 *R3, T2*	$9.30 *T2*	$8.00 *T2*	
	Houston, Tex.										5.625 *S2*			

IRON AGE

STEEL PRICES

(Effective March 6, 1956)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BARS						PLATES				WIRE
		Carbon Merchant	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				5.575 *B3*	7.425 *B3*	6.80 *B3*					
	Buffalo, N. Y.	4.65 *B3,R3*	4.65 *B3,R3*	6.30 *B5*	5.575 *B3,R3*	7.425 *B3,B5*	6.80 *B3*	4.50 *B3,R3*				6.60 *W6*
	Claymont, Del.							4.80 *C4*		6.30 *C4*	6.725 *C4*	
	Coatesville, Pa.							4.80 *L4*		6.30 *L4*	6.725 *L4*	
	Conshohocken, Pa.							4.50 *A2*	5.575 *A2*		6.725 *A2*	
	Harrisburg, Pa.							5.10 *P2*	5.575 *C3*			
	Hartford, Conn.			6.40 *R3*		7.725 *R3*						
	Johnstown, Pa.	4.65 *B3*	4.65 *B3*		5.575 *B3*		6.80 *B3*	4.50 *B3*		6.30 *B3*	6.725 *B3*	6.60 *B3*
	Fairless, Pa.	4.80 *U1*	4.80 *U1*		5.725 *U1*							
	Newark, N. J.			6.70 *W10*		7.60 *W10*						
	Camden, N. J.			6.70 *P10*								
	Bridgeport, Putnam, Conn.	4.80 *N8*		6.80 *W10*	5.725 *N8*			4.750 *N8*				
	Sparrows Pt., Md.		4.65 *B3*					4.50 *B3*		6.30 *B3*	6.725 *B3*	6.70 *B3*
	Palmer, Worcester, Readville, Mass. Milton, Pa.	4.80 *M7*	4.80 *M7*	6.70 *W11* 6.45 *C14* 6.70 *B5*		7.725 *A5,B5*		4.50 *R3*				6.90 *A5* 6.90 *W6*
	Spring City, Pa.			6.35 *K4*		7.60 *K4*						
MIDDLE WEST	Alton, Ill.	4.85 *L1*										6.775 *L1*
	Ashland, Newport, Ky.							4.50 *A7,N5*		6.30 *N5*		
	Canton-Massillon, Mansfield, Ohio	4.75 *R3*		6.25 *R2,R3*	5.575 *R3,T5*	7.425 *R2,R3, T5*		4.50 *E1*				
	Chicago, Joliet, Ill.	4.65 *U1, N4,W8,R3, P13*	4.65 *N4,R3, P13*	6.25 *B5,W8, W10,A5,L2*	5.575 *U1,R3, W8*	7.425 *A5,W8, W10,L2,B5*		4.50 *U1,W8, I3,R3* 4.725 *A1*	5.575 *U1*	6.30 *U1*	6.725 *U1*	6.60 *A5,R3, N4,W7*
	Cleveland, Ohio	4.65 *R3*	4.65 *R3*	6.25 *A5,C13*		7.425 *A5,C13*	6.80 *R3*	4.60 *J3,R3*	5.575 *J3*		6.725 *R3,J3*	6.60 *A5, C13*
	Detroit, Mich.	4.75 *G3*	4.75 *G3*	5.90 *R5* 6.45 *B5* 6.15 *P3* 6.10 *P8*	5.575 *R5* 5.675 *G3*	7.425 *R5* 7.625 *B5,P3, P8*	6.90 *G3*	4.60 *G3*			6.825 *G3*	
	Duluth, Minn.											6.60 *A5*
	Gary, Ind. Harbor, Crawfordsville	4.65 *I3, U1, Y1*	4.65 *I3, U1, Y1*	6.25 *M5,R3*	5.575 *I3, U1, Y1*	7.425 *M5, R3*	6.80 *U1,I3, Y1*	4.50 *I3, U1,Y1*	5.575 *I3*	6.30 *U1,Y1*	6.725 *U1, I3,Y1*	6.35 *M4*
	Granite City, Ill.							4.70 *G2*				
	Kokomo, Ind.											6.70 *C9*
	Sterling, Ill.	4.75 *N4*	4.75 *N4*									6.70 *N4*
	Niles, Warren, Ohio Sharon, Pa.	4.65 *R3,C10*		6.25 *C10*	5.575 *C10*	7.425 *C10*	6.80 *R3*	4.50 *S1,R3*		6.30 *S1*	6.725 *S1*	
	Pittsburgh, Pa. Midland, Pa.	4.65 *J3, U1, C11*	4.65 *J3, U1*	6.25 *A5,C8, C11,J3, W10,B4,R3*	5.575 *U1,C11*	7.425 *A5,C11, W10,C8,R3*	6.80 *J3, U1*	4.50 *J3, U1*	5.575 *U1*	6.30 *U1*	6.725 *J3, U1*	6.60 *A5,J3, P6*
	Portsmouth, Ohio											6.60 *P7*
	Weirton, Wheeling, Follansbee, W. Va.	4.65 *W3*						4.50 *W3,W5*				
	Youngstown, Ohio	4.65 *U1,Y1, C10,R3*	4.65 *U1,Y1, R3*	6.25 *Y1, U1*	5.575 *U1,Y1, C10*	7.425 *Y1,C10, F2*	6.80 *U1,Y1*	4.50 *U1,Y1, R3*		6.30 *Y1*	6.725 *Y1*	6.60 *Y1*
WEST	Emeryville, Cal.	5.40 *J5*	5.40 *J5*									
	Fontana, Cal.	5.35 *K1*	5.35 *K1*		6.625 *K1*		7.50 *K1*	5.15 *K1*		6.95 *K1*	7.375 *K1*	
	Geneva, Utah							4.50 *C7*			6.725 *C7*	
	Kansas City, Mo.	4.90 *S2*	4.90 *S2*		5.825 *S2*		7.05 *S2*					6.85 *S2*
	Los Angeles, Torrance, Cal.	5.35 *B2,C7*	5.35 *B2,C7*	7.35 *R3*	6.625 *B2*		7.50 *B2*				7.625 *B2*	7.55 *B2*
	Minnequa, Colo.	5.10 *C6*	5.10 *C6*					5.35 *C6*				6.50 *C6*
	Portland, Ore.	5.40 *O2*	5.40 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	5.35 *C7* 5.40 *B2,P9*	5.35 *C7* 5.40 *B2,P9*				7.55 *B2*					7.20 *C7*
	Seattle, Wash.	5.40 *B2,P12, N6*	5.40 *B2,P12*				7.55 *B2*	5.40 *B2*		7.20 *B2*	7.625 *B2*	
SOUTH	Atlanta, Ga.	4.85 *A8*	4.85 *A8*									6.45 *A8*
	Fairfield, Ala. City, Birmingham, Ala.	4.65 *T2,R3* 5.15 *C16*	4.65 *T2,R3* 5.15 *C16*				6.80 *T2*	4.50 *T2,R3*			6.725 *T2*	6.60 *R3, T2*
	Houston, Ft. Worth, Lone Star, Tex.	4.90 *S2*	4.90 *S2*		5.825 *S2*		7.05 *S2*	4.85 *L3* 4.60 *S2*		6.40 *S2*	6.825 *S2*	6.85 *S2*

Steel Prices *(Effective March 6, 1956)*

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angell Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, O.
A8 Atlantic Steel Co., Atlanta, Ga.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Cold Metal Products Co., Youngstown, O.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C17 Chester Blast Furnace, Inc., Chester, Pa.

D1 Detroit Steel Corp., Detroit
D2 Detroit Tube & Steel Div., Detroit
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.
D5 Henry Disston & Sons, Inc., Philadelphia

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimmons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G1 Globe Iron Co., Jackson, O.
G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit.
G4 Greer Steel Co., Dover, O.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Div., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N5 Newport Steel Corp., Newport, Ky.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Northeastern Steel Corp., Bridgeport, Conn.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P12 Pacific Steel Rolling Mills, Seattle
P13 Phoenix Mfg. Co., Joliet, Ill.

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Corp., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T6 Tremont Nail Co., Wareham, Mass.
T7 Texas Steel Co., Forth Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Co., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W11 Worcester Pressed Steel Co., Worcester, Mass.
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½–3 In.		2 In.		2½ In.		3 In.		3½–4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75								
Youngstown *R3*	18.50	1.25	21.50	5.25	24.00	8.75	26.50	10.00	27.00	11.00	27.50	11.50	29.00	11.75								
Fontana *K1*	7.00	+2.25	10.00	+8.25	12.50	+4.75	15.00	+3.00	15.50	+2.00	16.00	+1.50	17.50	+0.75								
Pittsburgh *J3*	18.50	1.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Alton, Ill. *L1*	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75								
Sharon *M3*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75								
Fairless *N2*	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75								
Pittsburgh *N1*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Wheeling *W5*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75								
Wheatland *W4*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75								
Youngstown *Y1*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Indiana Harbor *Y1*	17.50	2.25	20.50	6.25	23.00	9.75	25.50	10.00	26.00	11.50	26.50	12.00	28.00	11.75								
Lorain *N2*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	21.00	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75								
Youngstown *R3*	23.00	7.25	27.00	11.25	29.00	14.75	29.50	14.00	30.00	15.00	30.50	15.50	31.00	14.75								
Fairless *N2*	21.00	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75								
Fontana *K1*	11.50		15.50		17.50		18.00		18.50		19.00		19.50									
Pittsburgh *J3*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75
Alton, Ill. *L1*	21.00	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75								
Sharon *M3*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75								
Pittsburgh *N1*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75
Wheeling *W5*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75								
Wheatland *W4*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75								
Youngstown *Y1*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75
Indiana Harbor *Y1*	22.00	8.25	26.00	12.25	28.00	15.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75								
Lorain *N2*	21.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75

Threads only, buttweld and seamless 2¼ pt higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2 in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 11¢ to 13¢ would lower discounts; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.50¢ per lb.

(Effective March 6, 1956) *To identify producers, see Key on preceding page.*

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb
18	4	1	—	—	$1.60
18	4	1	—	5	2.305
18	4	2	—	—	1.765
1.5	4	1.5	8	—	.96
6	4	3	6	—	1.35
6	4	2	5	—	1.105

High-carbon chromium ..... .77
Oil hardened manganese ..... .43
Special carbon ..... .39
Extra carbon ..... .33
Regular carbon ..... .275

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*A3, J2, L4*) 10 pct	Plate (*A3, J2, L4*) 15 pct	Plate (*A3, J2, L4*) 20 pct	Sheet (*I2*) 20 pct
Stainless Type	304	30.30	33.15	36.05	32.50
	316	35.50	38.45	41.40	47.00
	321	32.00	34.85	37.75	37.25
	347	34.40	37.90	41.40	48.25
	405	25.80	29.60	33.35	.....
	410, 430	25.30	29.10	32.85	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 33.00; 1 side, 30.00.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Cold-Reduced (Coiled or Cut Length) Fully Processed
Field	8.40	8.60	.....
Armature	9.35	9.60	10.10
Elect.	9.95	10.20	10.70
Motor	10.95	11.20	11.70
Dynamo	11.85	12.10	12.60
Trans. 72	12.80	13.05	13.55
Trans. 65	13.35	Grain Oriented	
Trans. 58	13.85	Trans. 80	17.45
Trans. 52	14.85	Trans. 73	17.95

Producing points: Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*N5*); Niles, O. (*N3*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville (*A7*)
* Coils 75¢ higher.

LAKE SUPERIOR ORES

51.50% Fe natural content, delivered lower Lake ports. Prices for 1956 season. Freight changes for seller's account.

	Gross Ton
Openhearth lump	$12.10
Old range, bessemer	11.25
Old range, nonbessemer	11.10
Mesabi, bessemer	11.00
Mesabi, nonbessemer	10.85
High phosphorus	10.85

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Woven Wire Fence 9–15½ ga.	"T" Fence Posts	Single Loop Bale Ties Galv. Barbed and Twisted Barbless Wire	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
	Col	Col	Col	Col	Col
Alabama City *R3*	152	162	173	175	7.40	7.80
Aliquippa, Pa. *J3*	152	162	.....	.....	7.40	7.80
Atlanta *A8*	154	167	175	180	7.50	8.025
Bartonville *K2**	154	168	175	181	7.50	8.10
Buffalo *W6*	.....	.....	.....	.....	7.40	7.80
Chicago, Ill. *N4***	152	166	173	179	7.40	8.00
Cleveland *A6*	157	.....	.....	.....	7.40	.....
Cleveland *A5*	.....	.....	.....	.....	7.40	.....
Crawfordsville *M4**	154	167	175	175	7.50	8.05
Donora, Pa. *A5*	152	162	173	175	7.40	7.80
Duluth *A5*	152	162	173	175	7.40	7.80
Fairfield, Ala. *T2*	152	162	173	175	7.40	7.80
Galveston *D4*	157	.....	.....	.....	.....	.....
Houston *S2*	157	170	.....	180	7.65	8.05
Johnstown, Pa. *B3**	152	166	.....	175	7.40	7.80
Joliet, Ill. *A5*	152	162	173	175	7.40	7.80
Kokomo, Ind. *C9*	154	154	175	177	7.50	7.90
Los Angeles *B2**	.....	.....	.....	.....	8.35	8.925
Kansas City *S2*	157	167	178	180	7.65	8.05
Minnequa *C6*	157	167	162 178	180	7.65	8.05
Monessen *P6*	152	162	.....	.....	7.40	7.80
Moline, Ill. *R3*	.....	162	162	.....	.....	.....
Pittsburg, Cal. *C7*	171	185	.....	195	8.35	8.75
Portsmouth *P7*	.....	.....	.....	.....	7.40	.....
Rankin, Pa. *A5*	152	162	.....	175	7.40	7.80
So. Chicago *R3*	152	162	157 173	175	7.40	7.80
S. San Francisco *C6*	.....	.....	 197	195	8.35	8.75
Sparrows Pt. *B3**	154	.....	 175	181	7.50	8.075
Struthers, O. *Y1*	.....	.....	.....	.....	7.40	7.90
Worcester *A5*	158	.....	.....	.....	7.70	.....
Williamsport, Pa. *S5*	.....	 160	.....	.....	.....	.....

Galvanized products computed with zinc at 5¢ per lb
Exceptions: *zinc at 12.5¢ per lb; **13¢ zinc.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Bristol, Conn. *W12*	.....	.....	10.80	12.95	15.65
Buffalo, N. Y. *R7*	7.00	8.95	10.50	12.65	15.35
Carnegie, Pa. *S9*	.....	9.05	10.60	12.75	15.35
Cleveland *A5*	7.10	9.05	10.60	12.75	15.45
Detroit *D1*	7.20	9.15	10.70	12.85	.....
Detroit *D2*	7.20	9.15	10.70	.....	.....
Harrison, N. J. *C11*	.....	.....	14.80	18.15	22.00
Indianapolis *C5*	7.15	9.10	10.50	12.65	15.35
New Castle, Pa. *B4*	7.00	8.95	10.50	12.65	.....
New Haven, Conn. *D1*	7.55	9.35	10.90	13.05	.....
Pawtucket, R. I. *N7*	7.65	9.35	10.90	13.05	15.75
Pittsburgh *S7*	7.10	9.05	10.60	12.75	15.45
Riverdale, Ill. *A1*	7.20	9.05	10.60	12.75	15.45
Sharon, Pa. *S1*	7.10	9.05	10.60	12.75	15.45
Trenton *R4*	.....	.....	.....	.....	.....
Wallingford *W1*	7.45	9.25	10.80	12.95	15.65
Warren, Ohio *T4*	7.00	8.95	10.50	12.65	15.35
Weirton, W. Va. *W3*	7.10	8.95	10.50	.....	.....
Worcester, Mass. *A5*	7.65	9.35	10.90	13.05	15.75
Youngstown *C5*	7.00	8.95	10.50	12.65	15.35

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
Babcock & Wilcox	2	13	30.87	36.51	29.93	.....
	2½	12	41.57	49.16	40.31	.....
	3	12	47.99	56.76	46.55	.....
	3½	11	56.03	66.27	54.34	.....
	4	10	74.41	88.00	72.17	.....
National Tube	2	13	30.87	36.51	29.93	.....
	2½	12	42.57	49.16	40.31	.....
	3	12	47.99	56.76	46.55	.....
	3½	11	56.03	66.27	54.34	.....
	4	10	74.41	88.00	72.17	.....
Pittsburgh Steel	2	13	30.87	36.51	.....	.....
	2½	12	41.57	49.16	.....	.....
	3	12	47.99	56.76	.....	.....
	3½	11	56.03	66.27	.....	.....
	4	10	74.41	88.00	.....	.....

WAREHOUSES

Metropolitan Price, dollars per 100 lb.

Cities	City Delivery Charge‡	Sheets Hot-Rolled	Sheets Cold-Rolled	Sheets Galvanized (10 gage)	Strip Hot-Rolled	Strip Cold-Rolled	Plates	Shapes Standard Structural	Bars Hot-Rolled	Bars Cold-Finished	Alloy Bars Hot-Rolled 6415 As rolled	Alloy Bars Hot-Rolled 4140 Annealed	Alloy Bars Cold-Drawn 6415 As rolled	Alloy Bars Cold-Drawn 4140 Annealed
Baltimore	$.10	7.31	8.32	8.37	7.65	.....	7.63	7.93	7.61	8.62	14.38	13.44–13.96	16.36	16.29–16.49
Birmingham	.15	6.80	7.93	8.85	7.06	.....	6.99	7.28	7.08	9.35	.....	.....	.....	.....
Boston	.10	7.85	8.91	10.37	8.06	.....	7.99	8.23	7.97	9.77	.....	13.60	.....	16.70
Buffalo	.15	7.35	8.40	10.16	7.50	.....	7.80	7.75	7.50	8.25	.....	13.45	.....	16.50
Chicago	.15	7.28	8.29	9.25	7.36	.....	7.60	7.58	7.42	7.90	.....	13.20	.....	16.30
Cincinnati	.15	7.40	8.23	9.10	7.45	.....	7.89	7.90	7.51	8.15	13.59	13.29	16.44	16.39
Cleveland	.15	7.28	8.24	8.95	7.31	.....	7.77	7.76	7.33	8.00	13.41	13.11	16.26	16.21
Denver		8.60	10.76	11.22	8.90	.....	8.60	8.75	8.90	9.82	.....	.....	.....	17.97
Detroit	.15	7.47	8.43	9.53	7.49	.....	7.88	7.90	7.55	.....	13.70	13.40	16.55	16.50
Houston		7.85	8.75	10.49	8.15	.....	7.80	8.20	8.25	9.85–9.95	14.35	14.00	17.15	17.05
Kansas City	.20	7.47	8.76	9.17	7.73	.....	7.66	7.95	7.75	8.52	13.87	13.52	16.72	16.57
Los Angeles	.10	8.60	10.10	11.10	8.45	.....	8.85	8.40	8.25	11.00	.....	14.45	.....	18.00
Memphis	.10	7.12	8.25	.....	7.38	.....	7.31	7.60	7.40	9.15	.....	.....	.....	.....
Milwaukee	.15	7.37	8.48	9.34	7.45	.....	7.69	7.75	7.51	8.09	.....	13.29	.....	16.39
New Orleans	.15	7.28	8.35	.....	7.45	.....	7.40	7.70	7.50	9.55	.....	.....	.....	.....
New York	.10	7.71	8.94	9.69	8.27	.....	7.96	8.19	8.21	9.68	.....	13.53	.....	16.63
Norfolk	.20	7.25	.....	.....	7.65	.....	7.45	7.95	7.65	9.50	.....	.....	.....	.....
Philadelphia	.10	7.42	8.52	9.47	8.03	.....	7.78	7.84	7.78	8.56	.....	13.31	.....	16.41
Pittsburgh	.15	7.28	8.24	9.40	7.31	9.00	7.60	7.43	7.27	8.00	13.35	13.05	16.20	16.15
Portland		7.80–8.60	8.80–10.15	10.65	8.00	7.95	7.75	7.85–8.15	7.95	12.20	.....	15.00	.....	17.50
Salt Lake City	.20	.....	10.60	.....	9.35	.....	.....	9.20	9.15	.....	.....	.....	.....	.....
San Francisco	.10	8.20	9.75	10.25	8.45	.....	8.15	8.35	8.25	11.55	.....	14.45	.....	18.00
Seattle	.00	8.65	10.40	10.80	8.90	.....	8.40	8.40	8.60	.....	.....	14.65	.....	.....
St. Louis	.15	7.57	8.68	9.84	7.65	.....	7.89	7.98	7.71	8.44	.....	13.49	.....	16.59
St. Paul	.25	7.94	8.59–9.14	9.89	7.72	.....	7.65	7.94	7.74	8.51	.....	13.51	.....	16.31

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets for quantity.
Exceptions: (1) 1500 to 9999 lb. (2) 1000 lb or over. (3) $.25 delivery. (4) 1000 to 1999 lb, $.25 delivery.
*Plus analysis charge. ‡Deduct for country delivery.

(Effective March 6, 1956)

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Untreated
Bessemer *Ul*	4.725	5.65	5.825				
So. Chicago *R3*				7.90			
Ensley *T2*	4.725	5.65					
Fairfield *T2*		5.65		7.90		5.625	
Gary *Ul*	4.725	5.65				5.625	
Ind. Harbor *I3*	4.725		5.825	7.90		5.625	
Ind. Harbor *YI*				7.90			
Johnstown *B3*		5.65					
Joliet *Ul*		5.65	5.825				
Kansas City *S2*				7.90			
Lackawanna *B3*	4.725	5.65	5.825			5.625	
Lebanon *B3*							12.15
Minnequa *C6*	4.725	6.15	5.825	7.90		5.625	12.15
Pittsburgh *Ol*					11.90		12.15
Pittsburgh *P5*							12.15
Pittsburgh *J3*				7.90			
Seattle *B2*				8.40		5.775	12.65
Steelton *B3*	4.725		5.825			5.625	
Struthers *Y1*				7.90			
Torrance *C7*						5.775	
Williamsport *S5*		5.65					
Youngstown *R3*				7.90			

COKE

Furnace, beehive (f.o.b. oven) Net-Ton
Connellsville, Pa. ..... $14.00 to $14.50
Foundry, beehive (f.o.b. oven)
Connellsville, Pa. ..... $16.00 to $16.50
Foundry, oven coke
Buffalo, del'd $28.75
Chicago, f.o.b. 27.00
Detroit, f.o.b. 27.50
New England, del'd 28.55
Seaboard, N. J., f.o.b. 26.75
Philadelphia, f.o.b. 26.50
Swedeland, Pa., f.o.b. 26.50
Painesville, Ohio, f.o.b. 27.50
Erie, Pa., f.o.b. 27.50
Cleveland, del'd 29.43
Cincinnati, del'd 28.59
St. Paul, f.o.b. 26.50
St. Louis, f.o.b. 28.50
Birmingham, f.o.b. 25.65
Lone Star, Tex., f.o.b. 19.50

ELECTRODES

Cents per lb, f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE			CARBON*		
Diam. (In.)	Length (In.)	Price	Diam. (In.)	Length (In.)	Price
24	84	23.00	40	100,110	9.90
20	72	22.25	35	110	9.90
16 to 18	72	22.50	30	110	10.05
14	72	23.00	24	72 to 84	10.30
12	72	23.50	20	98	10.10
10	60	24.25	17	72	10.35
7	60	24.50	14	72	10.85
5	60	27.25	12	60	11.75
4	40	30.25	10	60	11.80
3	40	32.00	8	60	12.10
2½	30	33.75			
2	24	52.50			

* Prices shown cover carbon nipples.

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper
Cast elliptical, 18 in. or longer, 5000 lb lots 58.92
Electrodeposited 55.25
Brass, 80-20, ball anodes, 2000 lb or more 58.00
Zinc, ball anodes, 2000 lb lots.... 20.75
(for elliptical add 2¢ per lb)
Nickel, 99 pct plus, rolled carbon.. 90.50
(rolled depolarized add 3¢ per lb)
Cadmium $1.70
Tin, ball anodes and elliptical..$1.06 to $1.10

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum 83.50
Copper sulphate, 5 or more 100 lb bags, per cwt 18.15
Nickel salts, single, 4-100 lb bags.. 33.25
Nickel chloride, freight allowed, 300 lbs 43.50
Sodium cyanide, domestic, fob N. Y. 1 to 4 200 lb drums 21.55
(Philadelphia add .50 per lb)
Zinc cyanide, 100 to 900 lb 55.55
Potassium cyanide, 100 lb drum N. Y. 48.00
Chromic acid, flake type, 1 to 20 100 lb drums 31.20

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Machine and Carriage Bolt

	Discounts Full case	Full case 20,000 lb. Quantity or more
½ in. & smaller x 6 in. & shorter	61	63
Larger than ½ in. diam. and all diam. longer than 6 in.	55	57
Rolled thread carriage bolts ½ in. & smaller x 6 in. and shorter	61	63
Lag, all diam. x 6 in. & shorter	61	63
Lag, all diam. longer than 6 in.	55	57
Plow bolts	61	63

Nuts, Hex., H.P., reg. & hvy.

¾" or smaller	64	66
⅞" to 1⅛" inclusive	63	65
1¼" to 1½" inclusive	65	67
1⅝" and larger	61	63

C.P. Hex regular & hvy.

¾" or smaller	64	66
⅞" and larger	61	63

Hot Galv. Nuts (all types)

1½" or smaller	44	47

Finished, Semi-finished, Hex. Nuts

¾" and smaller	66	66
⅞" and larger	63	63

Add 25% for less than case or keg quantity.

Rivets

	Base per 100 lb
½ in. and larger	$9.95
	Pct Off List
7/16 in. and smaller	32

Cap Screws

	Discount Bright Treated	*H.C. Heat*
New std. hex head, packaged		
¼" thru ½" diam. x 6" and shorter	34	20
9/16" and ⅝" x 6" and smaller and shorter	31	16
¾", ⅞", 1" x 6" and shorter	9	+11
New std. hex head, bulk*		
¼" thru ½" diam. x 6" and shorter	49	41
9/16" and ⅝" diam. x 6" and shorter	43	39
¾", ⅞", 1" x 6" and shorter	31	20

*Minimum quantity per item:
15,000 pieces ¼", 5/16", ⅜" diam.
5,000 pieces 7/16", ½", 9/16", ⅝" diam.
2,000 pieces ¾", ⅞", 1" diam.

Machine Screws & Stove Bolts

	Discount Mach. Screws	Stove Bolts
Packaged, package list ...	27	38
Bulk, bulk list		
Quantity		
¼-in. diam. & under: 25,000-200,000	20	61
5/16-in. diam. & larger: 15,000-100,000	20	61
All diam. over 3 in. long: 5,000-100,000	—	61

Machine Screw & Stove Bolt Nuts

	Discount Hex	Square
Packaged, package list ...	24	27
Bulk, bulk list		
Quantity		
⅜-in. diam. & smaller: 25,000-200,000	18	20

CAST IRON WATER PIPE INDEX

Birmingham	109.3
New York	121.5
Chicago	122.9
San Francisco-L. A.	131.1

Dec. 1955 value, Class B or heavier 6 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1 issue. Source: U. S. Pipe and Foundry Co.

REFRACTORIES

Fire Clay Brick

Carloads per 1000

First quality, Ill., Ky., Md., Mo., Ohio, Pa., (except Salina, Pa., add $5.00) $122.00
No. 1 Ohio .....
Sec. quality, Pa., Md., Ky., Mo., Ill. 114.00
No. 2 Ohio 98.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50). 18.00

Silica Brick

Mt. Union, Pa., Ensley, Ala. $128.00
Childs, Hays, Pa. 138.00
Chicago District 138.00
Western Utah 144.00
California 151.00
Super Duty
Hays, Pa., Athens, Tex., Windham, Warren, O. 145.00
Curtner, Calif. 163.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.) 21.00
Silica cement, net ton, bulk, Hays, Pa. 24.00
Silica cement, net ton, bulk, Chicago District, Ensley, Ala. 22.00
Silica cement, net ton, bulk, Utah and Calif. 32.00

Chrome Brick

Per net ton

Standard chemically bonded, Balt.. $91.00
Standards chemically bonded, Curtner, Calif. 101.25
Burned, Balt. 85.00

Magesite Brick

Standard Baltimore $114.00
Chemically bonded, Baltimore 102.00

Grain Magnesite

St. ¾-in. grains

Domestic, f.o.b. Baltimore in bulk fines removed $64.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.
in bulk 40.00
in sacks 46.00

Dead Burned Dolomite

Per net ton

F.o.b. bulk, producing points in:
Pa. W. Va., Ohio $15.00
Midwest 15.60
Missouri Valley 14.00

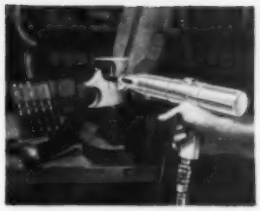
METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.i.f. New York, ocean bags ... 9.50¢
Canadian sponge iron, Del'd in East, carloads ... 9.5¢
Domestic sponge iron, 98+% Fe, carload lots ..... 9.5¢
Electrolytic iron, annealed, imported 99.5+% Fe ..... 27.5¢
domestic 99.5+% Fe ..... 36.5¢
Electrolytic iron, unannealed minus 325 mesh, 99+% Fe 57.0¢
Electrolytic Iron melting stock, 99.84% pure ..... 22.0¢
Carbonyl iron size 5 to 10 micron, 98%, 00.8+% Fe..86.0¢ to $1.55
Aluminum freight allowed 34.50¢
Brass, 10 ton lots ..... 37.50¢ to 50.00¢
Copper, electrolytic ..... 61.50¢
Copper, reduced ..... 61.50¢
Cadmium, 100-199 lb. 95¢ plus metal value
Chromium, electrolytic 99.85% min. Fe .03 max. Del'd... $5.00
Lead .....7.50¢ plus metal value
Manganese ..... 70.0¢
Molybdenum, 99% .....$3.00 to $3.25
Nickel, unannealed $1.00
Nickel, annealed $1.06
Nickel, spherical, unannealed, #80 ..... $1.18
Silicon ..... 43.50¢
Solder powder 7.0¢ to 9.0¢ plus met. value
Stainless steel, 302 ..... 99.0¢
Stainless steel, 316 ..... $1.32
Tin .....14.00¢ plus metal value
Tungsten, 99% (65 mesh) ... $4.50
Zinc, 10 ton lots .....18.75¢ to 32.50¢

ADD PROFITS - - CUT COSTS with
NEW *Speed-Nu-Matic*
PNEUMATIC SAW and FILE
1,000 USES - DOES ON-THE-JOB CLOSE WORK FAST!

Close work filing and sawing of iron, steel, aluminum, wood and other materials are easy with portable Speed-Nu-Matic. Adjusts for stroke of ¼" to 1¼" for dead-end jobs. Front barrel will rotate through 360° for scroll and circle cutting. Any speed can be set with throttle while in operation — or to full off position.



Fully portable for instant attachment to air supply, operates on 90 lbs. pressure. Weighs approx. 3¾ lbs. Uses standard hack saw blade and has ¼" hole in chuck for bench filing. Oscillating valve for smooth, fast performance. Replaceable Oillite bushing throughout all wearing surfaces for long life; no gears.

COMPLETE TOOL — NO ATTACHMENTS REQUIRED
$47.50
f.o.b. factory

GOOD TERRITORIES FOR JOBBERS WRITE NOW

WRITE FOR LITERATURE
R & G ENGINEERING CO.
1512 West Slauson Ave.
Los Angeles 47, Calif.

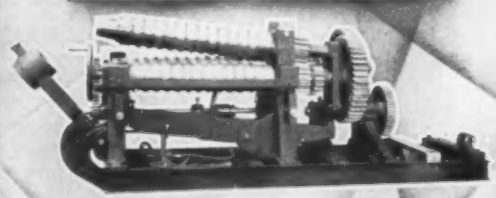
FOR THE RIGHT
SCRAP HANDLING COMBINATION...
Rugged Construction and LESS INITIAL COST
get
OWEN BUCKETS

WRITE FOR LITERATURE

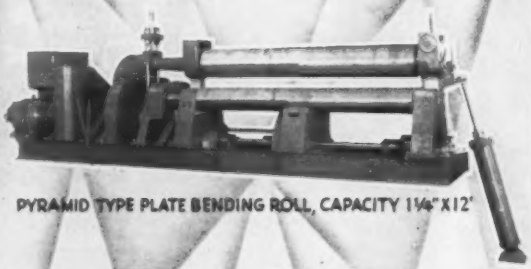
The OWEN BUCKET CO. • BREAKWATER AVE. • CLEVELAND 2, OHIO
Branches: New York, Philadelphia, Chicago, Berkeley, Calif., Ft. Lauderdale, Fla.
Manufacturers of OWEN CLAMSHELL BUCKETS

SHEET METAL and PLATE-WORKING MACHINES

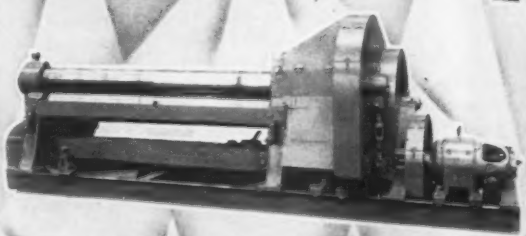
A complete line of heavy machinery for punching, shearing and bending sheet metal and heavy plates. . . .



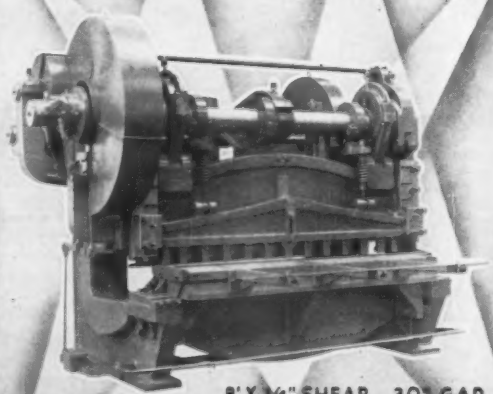
CORRUGATED CULVERT ROLL



PYRAMID TYPE PLATE BENDING ROLL, CAPACITY 1¼"X12'



INITIAL PINCH TYPE PLATE BENDING ROLL, CAPACITY ½"X8'



8'X¾" SHEAR, 30" GAP.

BERTSCH & COMPANY
CAMBRIDGE CITY INDIANA

Ferroalloy Prices

(Effective March 6, 1956)

Ferrochrome

Contract prices, cents per lb contained Cr, lump, bulk carloads, del'd, 67-71% Cr, .30-1.00% max. Si.

0.02% C	38.50	0.20% C	35.50
0.03% C	38.00	0.50% C	35.25
0.06% C	36.50	1.00% C	34.00
0.10% C	36.00	1.50% C	33.85
0.15% C	35.75	2.00% C	33.75

4.00-4.50 C, 67.70% Cr, 1-2% Si ... 26.25
3.50-5.00% C, 57-64% Cr, 2.00-4.50% Si ... 25.00
0.025% C (Simplex) ... 31.75

High Nitrogen Ferrochrome

Low-carbon type 0.75% N. Add 5¢ per lb to regular low carbon ferrochrome price schedule. Add 5¢ for each additional 0.25% of N.

Chromium Metal

Contract prices, per lb chromium contained, packed, delivered, ton lots, 97% min. Cr, 1% max. Fe.

0.10% max. C	$1.27
0.50% max. C	1.27
9 to 11% C, 88-91% Cr, 0.75% Fe	1.36

Electrolytic Chromium Metal

Contract prices per lb of metal 2" x D plate (⅛" thick) delivered packed, 99.80% min. Cr. (Metallic Base) Fe 0.20 max.

Carloads	1.25
Ton lots	1.27
Less ton lots	1.29

Low Carbon Ferrochrome Silicon

(Cr 34-41%, Si 42-45%, C 0.05% max.) Contract price, carloads, delivered, lump, 3-in. x down, per lb of Cr, packed.

Carloads	41.85
Ton lots	46.15
Less ton lots	48.65

Calcium-Silicon

Contract price per lb of alloy, lump, delivered, packed.
30-33% Cr, 60-65% Si, 3.00 max. Fe.

Carloads	22.95
Ton lots	25.25
Less ton lots	26.75

Calcium-Manganese—Silicon

Contract prices, cents per lb of alloy, lump, delivered, packed.
16-20% Ca, 14-18% Mn, 53-59% Si.

Carloads	23.05
Ton lots	24.95
Less ton lots	25.95

SMZ

Contract prices, cents per pound of alloy, delivered, 60-65% Si, 5-7% Mn, 5-7% Zr, 20% Fe ½ in. x 12 mesh.

Ton lots	19.65
Less ton lots	20.90

V Foundry Alloy

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis, V-5; 38-42% Cr, 17-19% Si, 8-11% Mn, packed.

Carload lots	17.20
Ton lots	18.70
Less ton lots	19.95

Graphidox No. 4

Cents per pound of alloy, f.o.b. Suspension Bridge, N. Y., freight allowed, max. St. Louis. Si 48 to 52%, Ti 9 to 11%, Ca 5 to 7%.

Carload packed	18.50
Ton lots to carload packed	19.65
Less ton lots	20.90

Ferromanganese

Maximum contract base price, f.o.b., lump size, base content 74 to 76 pct Mn.

Producing Point	Cents per-lb
Marietta, Ashtabula, O.; Alloy, W. Va.; Sheffield, Ala.; Portland, Ore.	10.25
Johnstown, Pa.	10.25
Sheridan, Pa.	10.25
Philo, Ohio	10.25
S. Duquesne	10.25

Add or subtract 0.1¢ for each 1 pct Mn above or below base content.
Briquets, delivered, 66 pct Mn:

Carloads, bulk	12.50
Ton lots packed	14.70

Spiegeleisen

Contract prices, per gross ton, lump, f.o.b. Palmerton, Pa.

Manganese	Silicon	
16 to 19%	3% max.	$89.50
19 to 21%	3% max.	91.50
21 to 23%	3% max.	94.00

Manganese Metal

Contract basis, 2 in. x down, cents per pound of metal, delivered.
95.50% min. Mn, 0.2% max. C, 1% max. Si, 2.5% max. Fe.

Carload, Packed	45.75
Ton lots	47.25

Electrolytic Manganese

F.o.b. Knoxville, Tenn., freight allowed east of Mississippi, f.o.b. Marietta, O., delivered, cents per pound.

Carloads	30.00
Ton lots	32.00
250 to 1999 lb	34.00
Premium for hydrogen-removed metal	0.75

Medium Carbon Ferromanganese

Mn 80% to 85%, C 1.25 to 1.50, Si 1.50% max. Contract price, carloads, lump, bulk, delivered, per lb of contained Mn... 22.35

Low-Carb Ferromanganese

Contract price, cents per pound Mn contained, lump size, del'd Mn 85-90%.

	Carloads	Ton	Less
0.07% max. C, 0.06% P, 90% Mn	33.00	35.55	36.75
0.07% max. C	30.95	33.50	34.70
0.10% max. C	30.20	32.75	33.95
0.15% max. C	29.45	32.00	33.20
0.30% max. C	27.95	30.50	31.70
0.50% max. C	27.45	30.00	31.20
0.75% max. C, 80-85% Mn, 5.0-7.0% Si	24.45	27.00	28.20

Silicomanganese

Contract basis, lump size, cents per pound of metal, 65-68% Mn, 18-20% Si, 1.5% max. C for 2% max. C, deduct 0.2¢ f.o.b. shipping point.

Carload bulk	11.50
Ton lots	12.95
Briquet contract basis carloads, bulk, delivered, per lb of briquet	13.15
Ton lots, packed	15.35

Silvery Iron (electric furnace)

Si 15.50 to 16.00 pct, f.o.b. Keokuk, Iowa, or Wenatchee, Wash., $98.50 gross ton, freight allowed to normal trade area. Si 15.01 to 15.50 pct, f.o.b. Niagara Falls, N. Y., $93.00.

Silicon Metal

Contract price, cents per pound contained Si, lump size, delivered, packed.

	Ton lots	Carloads
96.50% Si, 2% Fe	22.75	21.45
98% Si, 1% Fe	23.25	21.95

Silicon Briquets

Contract price, cents per pound of briquets, bulk, delivered, 40% Si, 2 lb Si briquets.

Carloads, bulk	7.15
Ton lots, packed	9.75

Electric Ferrosilicon

Contract price, cents per lb contained Si, lump, bulk, carloads, f.o.b. shipping point.

50% Si	12.75	75% Si	15.40
65% Si	14.50	85% Si	17.10
		90% Si	18.50

Calcium Metal

Eastern zone contract prices, cents per pound of metal, delivered.

	Cast	Turnings	Distilled
Ton lots	$2.05	$2.95	$3.75
Less ton lots	2.40	3.30	4.55

Ferrovanadium

50-55% V contract, basis, delivered, per pound, contained V, carloads, packed.

Openhearth	3.10
Crucible	3.20
High speed steel (Primos)	3.30

Alsifer, 20% Al, 40% Si, 40% Fe, Contract basis, f.o.b. Suspension Bridge, N. Y., per lb.

Carloads	10.65¢
Ton lots	11.80¢

Calcium molybdate, 43.6-46.6% f.o.b. Langeloth, Pa., per pound contained Mo ... $1.34

Ferrocolumbium, 50-60%, 2 in. x D contract basis, delivered per pound contained Cb.

Ton lots	$6.90
Less ton lots	6.95

Ferro-tantalum-columbium, 20% Ta, 40% Cb, 0.30% C, contract basis, del'd, ton lots, 2-in. x D per lb con't Cb plus Ta ... $4.65

Ferromolybdenum, 55-75%, 200-lb containers, f.o.b. Langeloth, Pa., per pound contained Mo .. $1.54

Ferrophosphorus, electric, 23-26%, car lots, f.o.b. Siglo, Mt. Pleasant, Tenn., $4.00 unitage, per gross ton ... $90.00
10 tons to less carload ... $110.00

Ferrotitanium, 40% regular grade, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti ... $1.35

Ferrotitanium, 25% low carbon, 0.10% C max., f.o.b. Niagara Falls, N. Y., and Bridgeville, Pa., freight allowed, ton lots, per lb contained Ti ... $1.50
Less ton lots ... $1.55

Ferrotitanium, 15 to 18% high carbon, f.o.b. Niagara Falls, N. Y., freight allowed, carload, per net ton ... $177.00

Ferrotungsten, ½ x down, packed, per pound contained W, ton lots, delivered ... $3.45

Molybdic oxide, briquets, per lb contained Mo, f.o.b. Langeloth, Pa. ... $1.33
bags, f.o.b. Washington, Pa., Langeloth, Pa. ... $1.30

Simanal, 20% Si, 20% Mn, 20% Al, contract basis, f.o.b. Philo, Ohio, freight allowed, per lb.

Carload, bulk lump	17.50¢
Ton lots, packed lump	19.50¢
Less ton lots	20.00¢

Vanadium oxide, 86 - 89% V_2O_5 contract basis, per pound contained V_2O_5 ... $1.33

Zirconium contract basis, per lb of alloy
35-40%, f.o.b. freight allowed, carloads, packed ... 26.25¢
12-15%, del'd, lump, bulk-carloads ... 8.50¢

Boron Agents

Borosil, contract prices per lb of alloy del. f.o.b. Philo, Ohio, freight allowed. B, 3.14%, Si 40-45%, per lb contained B ... $5.25

Bortam, f.o.b. Niagara Falls

Ton lots, per pound	45¢
Less ton lots, per pound	50¢

Corbortam, Ti 15-21%, B 1-2% Si 2-4%, Al 1-2%, C 4.5-7.5% f.o.b. Suspension Bridge, N. Y., freight allowed
Ton lots per pound ... 10.00¢

Ferroboron, 17.50% min. B, 1.50% max. Si, 0.50%, max. Al, 0.50% max. C, 1 in. x D, ton lots ... 1.20
F.o.b. Wash., Pa.; Niagara Falls, N. Y. delivered 100 lb up

10 to 14% B	.85
14 to 19% B	1.20
19% min. B	1.50

Grainal, f.o.b. Bridgeville, Pa., freight allowed, 100 lb and over

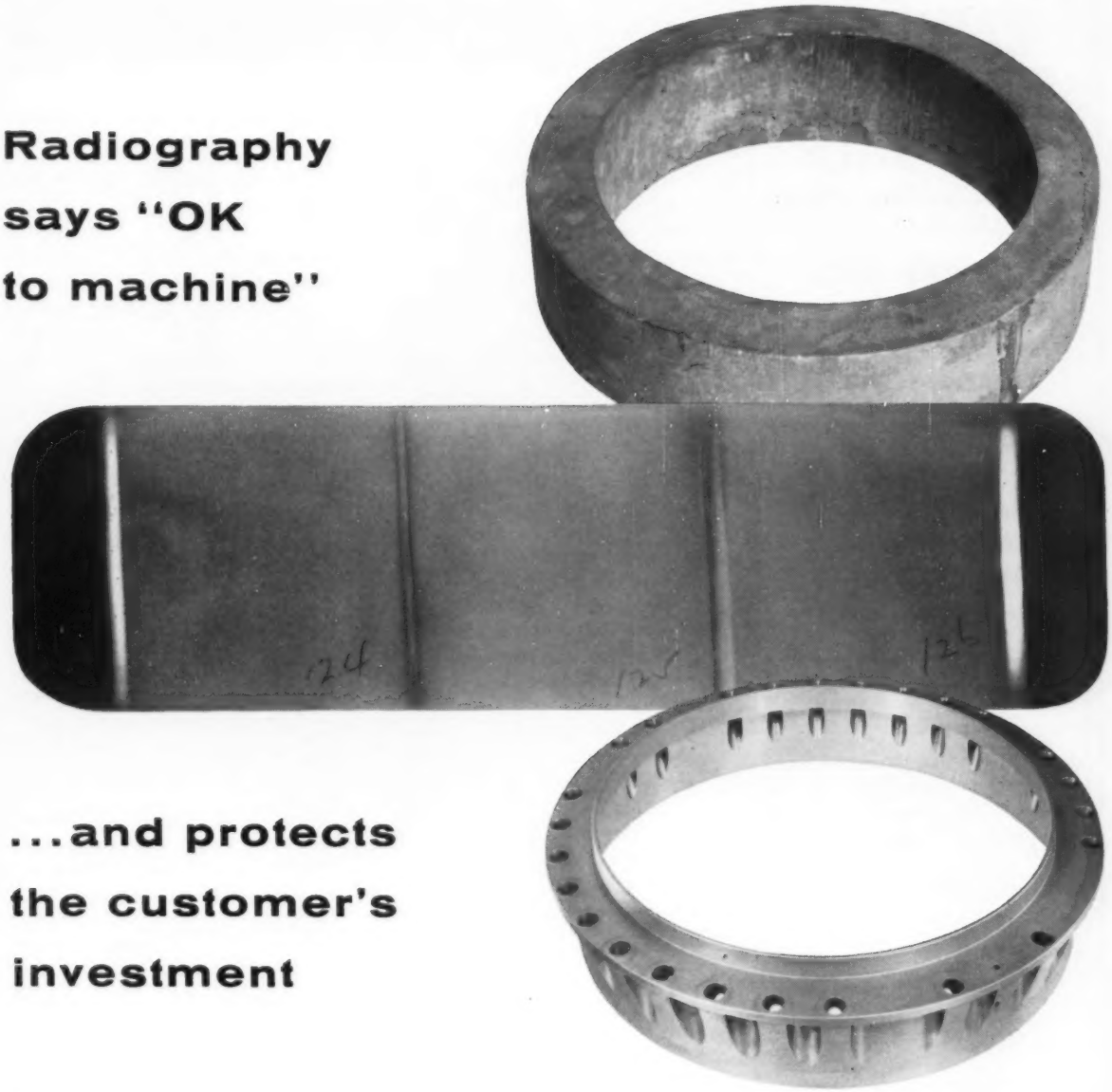
No. 1	$1.05
No. 79	50¢

Manganese - Boron, 75.00% Mn, 15-20% B, 5% max. Fe, 1.50% max. Si, 3.00% max. C, 2 in. x D, del'd.

Ton lots	$1.46
Less ton lots	1.57

Nickel-Boron, 15-18 B, 1.00% max. Al, 1.50% max. Si, 0.50% max. C, 3.00% max. Fe, balance Ni, del'd less ton lots ... $2.05

Radiography says "OK to machine"



...and protects the customer's investment

The blank for this stainless steel jet engine part starts as a mill rolled bar, is shaped under heat and pressure, and flash-welded to form a homogeneous ring. Any porosity or lack of fusion could put the part in the scrap-heap—scrapping with it the buyer's investment of machining time which is five times the cost of the blank itself.

To guard its customers against such losses, The American Welding & Manufacturing Co., Warren, Ohio, makes extensive use of radiographic inspection. Only rings with welds *proved* sound are delivered to the buyer. Possible loss of machining time—with costs as great as $300—is avoided at the outset.

Radiography does a great job for welding. It saves time and money as in this case. It gives customers great confidence and peace of mind. It opens new applications where the welding process was once frowned on.

Radiography can help you build business. If you would like to know how, talk it over with your x-ray dealer.

EASTMAN KODAK COMPANY
X-ray Division
Rochester 4, N.Y.

RADIOGRAPHY...

another important example of Photography at Work

Kodak
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RAILWAY EQUIPMENT FOR SALE

Used - As Is - Reconditioned

RAILWAY CARS

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FREIGHT CAR REPAIR® PARTS

For All Types of Cars

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AIR DUMP CARS

(Side Discharge)

Magor—30-Cubic Yard, 50-Ton Capacity, Lift Door Type.

RAILWAY TANK CARS and STORAGE TANKS

6,000- 8,000- and 10,000-Gallon Cleaned and Tested

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"ANYTHING containing IRON or STEEL"

THE CLEARING HOUSE

News of Used and Rebuilt Machinery

West Coast Needs Equipment . . . If you have used machinery to sell, be sure to check West Coast markets. Dealers here need equipment! While business is excellent, it's tough to get enough machines to sell. Some items are scarcer than a smog-free day in Los Angeles.

West Coast dealers are scrambling around eastern markets in earnest. Happiest hunting grounds: Chicago, Detroit, Cleveland, New York.

One Los Angeles dealer puts it this way: "We could sell any good, serviceable equipment we can put our hands on. It hurts to see the stuff eastern and midwestern companies are junking. They just don't realize there's a good market for it in the Farwest."

Only a few weeks ago, dealers here were buying one or two machines at a time, many sight-unseen. Today, they're out searching the eastern markets in person, and bringing back carload lots.

Here's what they're after: turret lathes, 1945 or newer; late-type horizontal and vertical boring mills; practically any age punch presses in 25-ton to 200-ton sizes, and 50-ton to 100-ton hydraulic presses.

What's Selling? . . . Sheet metal equipment sales are riding high. Late-type machines in good condition enjoy the fastest sales. Even old machines are now getting a good play. Best sellers: small power shears and brakes.

In Los Angeles, however, sales of heavy steel fabricating equipment are slowing up a bit. Dealers claim it reflects shortages in some structural shapes. One dealer says simply, "The customer just won't buy the heavy duty metal-working equipment when he can't get the metal to work on."

Single and double-end multiple gang punches are sitting around on dealers' floors. But, there is good demand for angle bending rolls of any capacity and age in good condition.

And Up North . . . In the San Francisco Bay Area, business is so good with the used machinery people they have to keep their eyes open and scout around for good salable items.

"Just about everything is moving," one dealer says. "The merchandise doesn't even have to be modern, just in good shape."

One businessman pointed out that business so far is holding the high level of last quarter '55, which is sharply above the same period for the preceding year.

This rosy outlook was shared by other dealers queried. One dealer, after expressing exuberance over the present merry sales pace, says he can't see any let-down ahead.

How About Prices? . . . Prices range from firm to rough. Although used machinery prices on the average are up about 50 pct since June of last year, they continue to rise, one dealer notes, about 5 pct to 10 pct a month.

For that reason, foreign-made tools are becoming popular. In one instance, a dealer who's enjoying a growing volume of such sales, points out that foreign tools can be sold at about the same price as good American-made products. Since qualitywise, foreign machines are improving, customer acceptance has been moving up, dealers say.

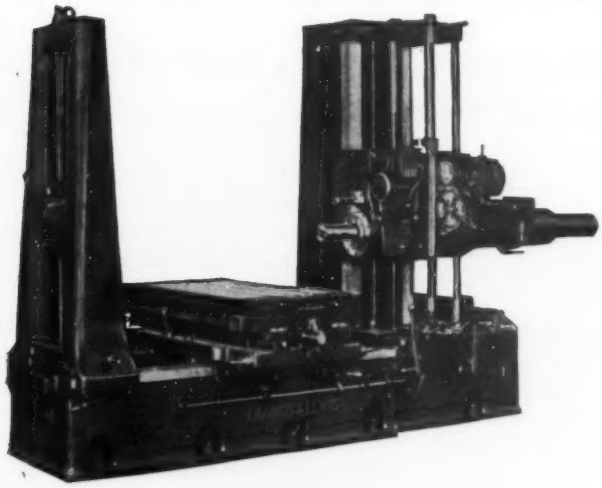
Situation in Seattle . . . The "good business-short supply" story also is holding true in the Seattle area.

Heavy machine tools are in extremely short supply. Dealers here, too, are depending on eastern suppliers of used machinery.

Deliveries to customers on such items as radial drills, lathes, and presses are 3 to 4 months behind.

EMERMAN OFFERS FROM STOCK

FOR SALE . . . FOR RENT

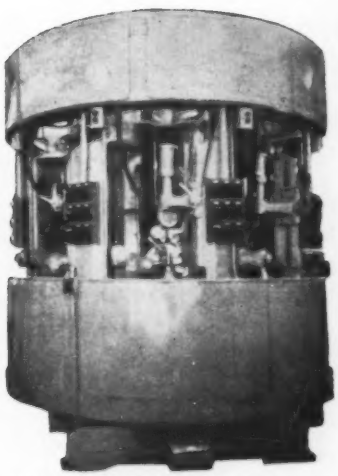


330T GIDDINGS & LEWIS HORIZ. BORING, DRILLING & MILLING MACHINE
Serial 6041—New 1942

Diameter main spindle 3"
Longitudinal travel 24"
Diameter of high speed spindle 2"
Longitudinal travel 9"
Range of speeds, 36, main spindle 8.3 to 500 RPM
Range of speeds, 36, high speed spindle 25 to 1500 RPM
Range of feeds, per rev. of spindle 18, main spindle .007" to .375"
Range of feeds, per rev. of spindle 18, high speed spindle .002" to .125"
Max. dist. table top to spindle center, main spindle 24"
Max. dist. table top to spindle center, high speed spindle 31"
Range of milling feeds 18, .5" to 25" per min.
Rapid traverse 120" per min.
Working surface of table 30" x 60"
Cross travel of table 48"
Max. dist. spindle sleeve to end support 72"
Equipped with 15 HP 3/60/220-440/1160 motor
Weight approx. 22,000 lbs.

36-72 CINCINNATI HORIZONTAL HYDROTEL MILLING MACHINE
Serial No. 42M360576-15—New in 1942

Table working surface 36" x 93"
Range: Longitudinal 72"
Vertical 48"
Cross 18"
Spindle Speeds: (16) 12 to 720 RPM
Infinite Number of feed rates, .6 to 15"/min.
Spindle Drive Motor: 10 HP 3/60/220-440 V/1150 RPM
Table Motor: 7½ HP. 3/60/220-440 V/1160 RPM
Approx. weight 50,000 lbs.



7A LEES BRADNER 8" x 20" GEAR HOBBER
Serial No. 7A-360-7A-367—1947

Rated capacity in steel 4DP
Max. diam. capacity with 3" hob 8"
Max. diam. capacity with 4" hob 7"
Travel (max. face width) 21"
Capacity: Nose W/S to T/S center 25"
Max. Helix angle R or L Hand 45°
Taper in nose of work spindle #14 B & S
Hob arbor diam. 1¼"
Max. hob diam. 4"
Max. hob length 4"
Axial shift of hob 2"
Equipped with:
Hob shifters
Motors and electrical equipment

1½" 6—Spindle Cone Auto. Screw Machine, Ser. 3067-SK, 1942
4" Sellers Horiz. Table Type Boring Mill, Ser. 04-1317, 1942, Over size Machine
330T Giddings & Lewis Boring Mill, Horiz., Ser. 6041, Comp. Elecs., 1941
78" Betts Heavy Duty Vert. Boring Mill, Comp. Elecs., Ser. BR-IC-9 and Ser. BE-IC-20, 1942 (2)
1212A Ex-Cell-O Double End Precision Boring Machine, Hyd. Cross Sldg. Table, Ser. 20517, 1945
40-Ton LaPointe, Model SRV, Vert. Surface Broach, 66" Stroke, Ser. 43200, New 1943
HP 100 LaPointe Broach, 50-Ton Cap., 78" Stroke, W/Outer Support, Ser. 52149, 1952
#24 Gleason Straight Bevel Gear Generator, 35½" Diam., Ser. 17916, 1942
Type A Barber Colman Gear Hobber, Extended Bed, Power Down Feed, Ser. 1363, 1942
20" x 72" Cincinnati Plain Cyl. Grinder, Filmatic Bearings, 84" Centers, Ser. 7BF1Y-2, 1952
72" LaPointe Universal Broach Grinder, Ser. 52004, 1952
#36 Hanchett Rotary Surface Grinder, Ser. 346, 1943
#2 Cincinnati Tool & Cutter Grinder, Ser. 1D2TIL-1932, 1943

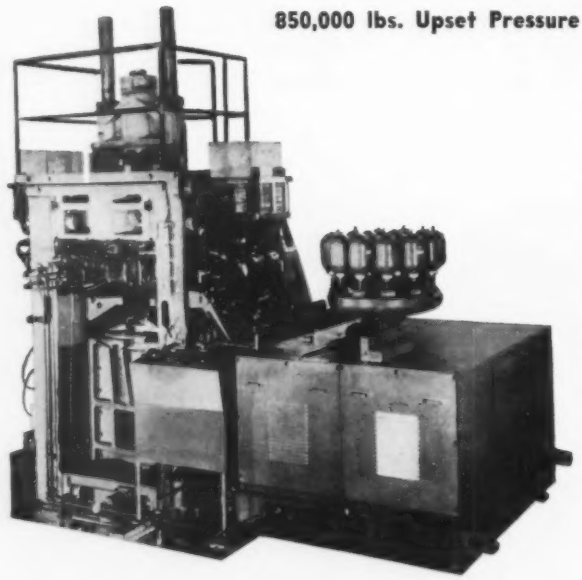
24½" x 28' Monarch Engine Lathe, 2 Carriages, 2 Taper Atts., Rapid Traverse, Ser. 6806, 1940
#22B Bardons & Oliver Saddle Type Turret Lathe, 4½" Hyd. Bar Feed, Hyd. Preselector Head, Ser. 17013, 1947
18" x 54" Monarch Tool Room Model CW Lathe, Ser. 17468, 1942
30" x 18' Niles Engine Lathe, Ser. 21904, 1942
14" x 54" Lodge & Shipley Engine Lathe, Ser. 35524
22" x 72" Lehmann Lathes, Serials 5211, 5213, (2)
18" x 54" American Pacemaker Engine Lathe, Speeds 1500 RPM, Ser. 61770-40, New 1940
3FU Foster Fastermatic Automatic Turret Lathe
4FU Foster Fastermatic Automatic Turret Lathe
#4 Cincinnati Hi-Speed Dial Type Plain Mill, Ser. 4A4P1L-132, 1942
#3N Kearney & Trecker Universal Mill, Ser. 93-4228, 1943
#4 Cincinnati Hi-Speed Dial Type Vert. Mill, Ser. 8A4V1K-35, 1941
36" Rockford Hydraulic Vert. Slotter, Ser. 47-S1-85, 1946

120th St., Chicago 43, Ill. • PUllman 5-7626

1200 KVA FLASH-BUTT WELDER

TAYLOR-WINFIELD VERTICAL FLASH-BUTT WELDER

850,000 lbs. Upset Pressure 300,000 Ampere Weld Current (Max.)



Self Contained Hydraulic System; Upset Accumulator; Ignitron Contactor. Manual, Semi-automatic or Fully Automatic Operation. Self contained operator's panel. External fixture Loader. Phase Shift heat control.

Fully adaptable for a wide range of welding applications.

Virtually New.

Offered at a substantial saving.

Located in Philadelphia.

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54" INGERSOLL VERTICAL MILL

AC—3 ph. 60 cy. 220—440
Approx. $5,000.00 Parts—
Cutting Tools—Milling Cutters

In shop of original owner—
See under power—
Cost new $42,000.00
for quick removal $6250.00

PEARSON MFG. CO.
800 Beaver Ave. N. S.
Pittsburgh 33, Pa. Cedar 1-3300

FOR SALE

Furnaces, Oven & Pickling Unit
Immediate Delivery

Two—E. F. Roller Hearth, gas fired, 1850°F, 66" W x 46" H x 48' Long, complete with controls & electrical—new 1951.

One—Dispach Electrical Oven, continuous mesh belt, 52" W x 40" H x 30' Long, with cooling chamber, complete with controls & electrical—new 1952.

One—Ranschoff Continuous Pickling & Soap Coating Machine, complete with controls & electrical, new 1952.

Priced right before removal from plant.

Amco Machinery Co.
125 Leib Street, Detroit 7, Mich. LOrain 7-1070

CRANES
FOR SALE

Five 5 ton 47' span 230 V DC
One 7½ ton 52' span 3/60/440 V AC
Two 10 ton 47' span 230 V DC
One 10 ton 72' span 230 V DC wired for magnet
Two 10 ton 68' span 3/60/440 V AC with 3 ton auxiliary hoist
Two 15 ton 75'6" span 3/60/440 V AC with 5 ton auxiliary hoist
One 15 ton 75'6" span 3/60/440 V AC with 5 ton auxiliary hoist and 400 ft outdoor "A" frame runway, columns
One 20 ton 63'10" span 3/60/440 V AC—each carriage has 10 ton hoist
One 40 ton 70'8" span 230 V DC—each carriage has 20 ton hoist
Two 60 ton 70'6" span 230 V DC—each carriage has 30 ton hoist and 5 ton auxiliary
One 120 ton 68' span 3/60/440 V AC—each carriage has 60 ton hoist and 10 ton auxiliary
One 120 ton 70'6" span 3/60/440 V AC—each carriage has 60 ton hoist and 10 ton auxiliary

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NARBERTH, PENNA.
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Overhead Cranes & Hoists
New and Used
10 Ton Cleveland Crane, 45'0" span, 230 VDC with motor generator set. Cage Controlled.
5-ton P&H crane, 3-motor, 45'0" span, 220 vs. 3 ph. 60 cy. cage operated.
100 Other Cranes, various spans, tonnages and current.
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710 House Bldg. Pittsburgh 22, Pa.
Telephone: Gr. 1-4440

PRACTICALLY NEW DOUBLE CRANK PRESSES

Bliss No. 9-108W, cap. 400 tons, Bed 108" x 60".
Bliss No. 8-120, cap. 290 tons, Bed 120" x 50".
Minster No. 50-7-72, cap. 200 tons, Bed 72" x 50".
Bliss No. 6-84W, cap. 140 tons. Bed 84" x 36".
Bliss Toledo No. 93½-J, cap. 140 tons, Bed 108" x 48".

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16' x ¼" Bertsch Initial Type Bending Roll
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24' x ½" Hilles & Jones Pyramid Type
BRAKES—LEAF TYPE
12' x ¾" Dreis & Krump
12' x ⅛" Dreis & Krump, Motor Driven
BRAKE—PRESS TYPE
14' x ¼" Cincinnati Series 120-14
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Model VP-4-40-40 American Vertical Hydr. Broach. Max. Capacity 60 ton. Stroke 40", Motor Drive
BULLDOZER
#27 Williams & White, 22" Stroke, 16" x 80" Face of Crosshead
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5 ton P&H	29' Span	230 Volt D.C.
5 ton Cleveland	96' Span	230 Volt D.C.
7½ ton P&H	65' Span	440/3/60 A.C.
10 ton P&H	58' Span	230 Volt D.C.
10 ton Milwaukee	80' Span	230 Volt D.C.
10 ton P&H	96' Span	220 Volt D.C.
15 ton Northern	48' Span	220/3/60 A.C.
20 ton P&H	60' Span	230 Volt D.C.
20 ton Toledo	75' Span	550/3/60 A.C.
120 ton Whiting	80' Span	220/3/60 A.C.

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⅝" McCabe Pneumatic Flanging Machine
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2000 lb. Chambersburg Ceco-Drop
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96" Aetna-Standard, 19 Rolls 2½" Dia.
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800 ton Clearing 48" Stroke, Bed Area 48" x 48"
1000 ton Lake Erie Double Acting 46" Stroke, Bed Area 72" x 146"
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2045 ton Birdsboro, 4 Columns, 14" Stroke Piston Platen 42" x 40" Daylite 47"
4500 ton B-L-H Hydr. Forging Press
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Verson 81-40 Mech. Eccentric Type Single Point Suspension Press, 200 ton, 30' Stroke
#667 Bliss Toledo 1200 ton Knuckle Joint Press
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Style EF Cleveland 36" Throat, Punch 1¼" thru 1"
Style W Cleveland 60" Throat, 312 Ton
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2	1250	Whse.	720	600	2300
1	500	Cr. Wh.	720	600	2300/440
2	550	Whse.	1200	125/250	2300/440
1	400	Cr. Wh.	1200	125/250	2300/440
1	300	G.E.	1200	250	2300
1	200	G.E.	1200	250	2300
1	150	G.E.	1200	250	2300
1	100	Whse.	990	250	2300

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Qu.	H.P.	Make	R.P.M.	Volts	Type
2	3500	Whse.	600	525	tandem
6	1500	Whse.	600	525	Encl.
1	1250	G.E.	250/720	600	MCF-6
4	800	Whse.	600	525	Encl.
4	700	Whse.	300/700	250	Encl.
2	600	Al. Ch.	300/600	550	Mill
1	250	Al. Ch.	250/1000	250/375	Mill

SLIP RING MOTORS
Constant Duty, 3 Phase, 60 Cycle

Qu.	H.P.	Make	Type	Volts	R.P.M.
1	1500	G.E.	MT-498	2300	360
2	1000	G.E.	M-575-8	2300	1185
1	750	G.E.	I-M	2200	400
1	500	Al. Ch.	ANY	2200	505
1	500	G.E.	I-M	2300	450
1	450	G.E.	I-14-M	2300	505
1	450	Whse.	CW	2200	440
1	400	Al. Ch.	ANY	2200	505
1	400	G.E.	MT-424	2300/440	352
1	300	Whse.	CW-1012	2200	704
1	250	Al. Ch.	ANY	440	705
1	250	Whse.	CW-1108	2200	435
1	250	G.E.	MT-414	2200	380
2	200	Al. Ch.	ANY	2200	585
1	200	G.E.	I-14-M	2200	490
1	150	Al. Ch.	ANY	440/220	705
1	150	Whse.	CW	440/220	490
1	150	Whse.	CW-1000	440/220	435
1	100	Whse.	CW	440/220	870
1	100	El. Dy.	EDY-612	2300	900
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1	1100	G.E.	IM	2300	720
1	1000	A.C.	Mill	2300	240
1	800	G.E.	MT	2300	293
1	750	G.E.	MT-573	2200	1190
1	700	A.C.		2300	500
1	500	Whse.	CW	550	350
1	400	Whse.	CW-960A	440	1170
1	400	Whse.	CW	440	514
1	400	Whse.	CW-1213	2200	435
1	350	G.E.	IM-17A	440/2200	720
1	250	G.E.	MT-424Y	4000	257
1	250	G.E.	MT-559S	2200	1800
1	250	Al. Ch.		550	600
1	200	Cr. Wh.	20QB	440	505
1	200	G.E.	IM	440	435
1	200	G.E.	IM	2200	580
1	150 (unused)	Whse.	CW	2300	435
2	125	A.C.		440	865
1	125	Al. Ch.		440	720
1	100	G.E.	IM-16	2200	435
1	100	G.E.	IM	440	600
4	100	A.C.	ANY	440	695

SQUIRREL CAGE

1	800	G.E.	KT-573	2200	1180
2	650	G.E.	FT-559BY	440	3570
2	450	Whse.	CS-1420	2300/4150	354
1	400	G.E.	IE-15B	2200	1165
1	400	G.E.	IK	2200	500
1	200	G.E.	IK-17	440	580
3	200	G.E.	KT-557	440	1800
1	150/75	G.E.	IK	440	900/450
1	150	Whse.	CS-856S	440	880
1	150	Whse.	CS	440	580
2	125	Al. Ch.	ARW	2200	1750
1	100	Whse.	CS-876C-TEFC	440	710

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2	2000	Whse.		2300	120
2	1750	G.E.	ATI	2300	3600
1	735	G.E.	ATI	2200/12000	600
1	500	Ideal	SM	2300/4160	1800
2	500	G.E.	TS-7567	2200	1200
1	450	Whse.		2200	128.5
1	450	Whse.		2200	450
1	400	G.E.	TS-7565	2200	1200
1	400	G.E.	TS	2200	400
1	4350	C.W.	3501SL	4000/6900/13800	514
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16x72" Landis Plain, m.d.
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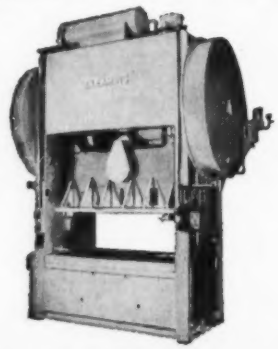

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500	*G.E.	KT569S	900
500	G.E.	KT-424	450
450	*Al. Ch.	ARW	1800
400	G.E.	KT-424	360
300	*G.E.	K-6344Y	1200
300	G.E.	K-6353TEFC	720
250	Westg.	CS-TEFC	1800
250	G.E.	KT-559	1800
250	*L.-Allis	OEX-148	720
250	*G.E.	IK	600
250	G.E.	IK-17A	600
250	Westg.	CS-14	514
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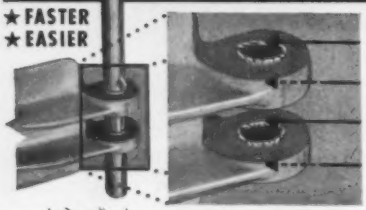

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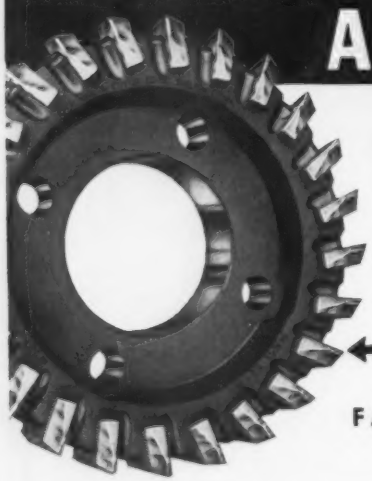

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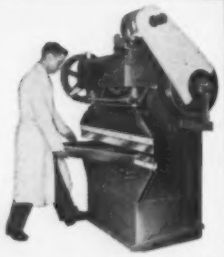

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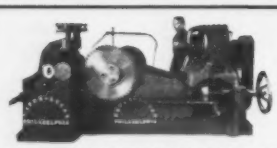

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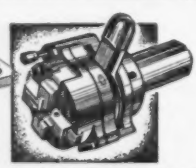

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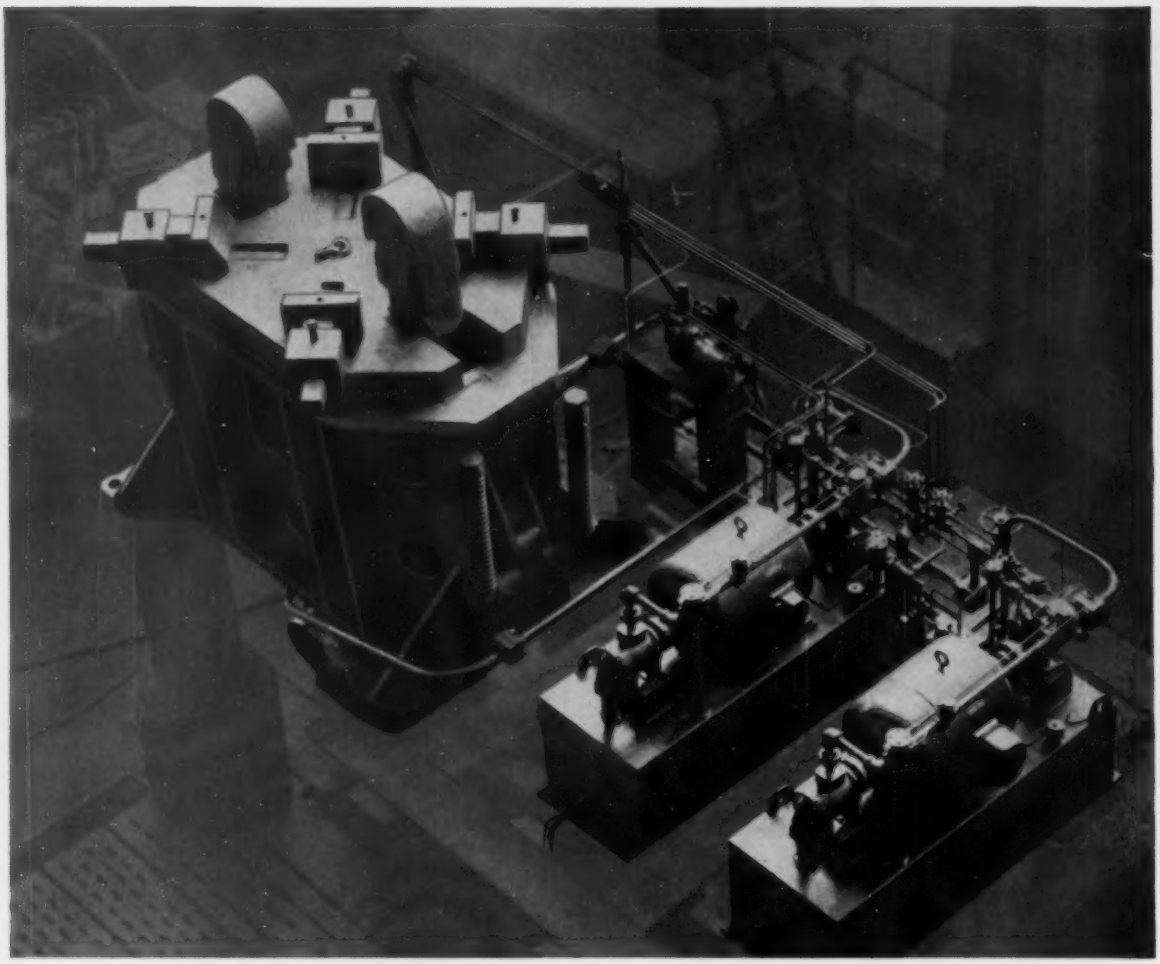

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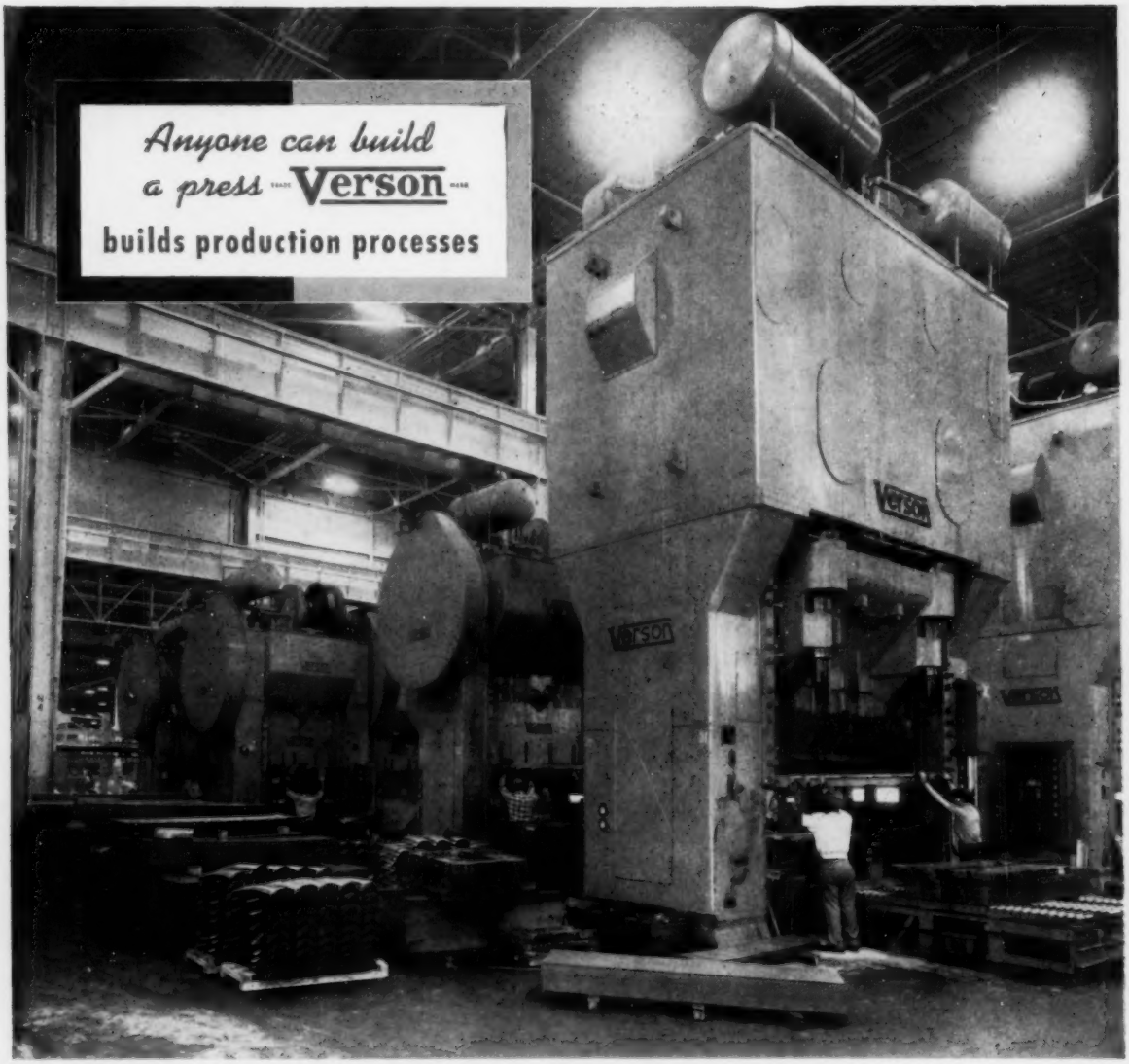

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